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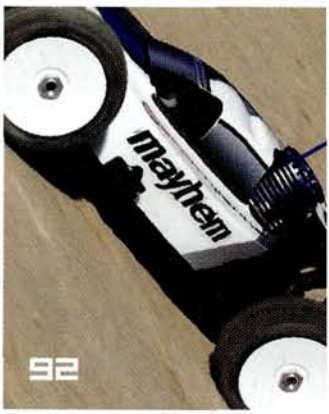

[STARTING LINE]

More track time please!

RACING IS ALWAYS A TOPIC OF CONVERSATION HERE AT RC CAR ACTION, especially with two IFMAR World Championships covered in this issue. As it often does, the conversation turned to what we'd like to see more of in racing. Every facet of RC racing performance is at an all-time high, from engine and motor horsepower and reliability to vehicle handling and durability. Battery capacity is way up, and radio technology is practically foolproof. And while the many manufacturers of RC racing gear are always looking for a little more speed, power and performance, what I really want more of from my racing experience can't be boxed up or stapled to a header card. I want more track time!

Thanks to their quick pit-stop capability, nitro cars have had the lock on track time, but with today's super-cells, there's no reason the battery crowd can't run longer qualifiers, even up to 10 minutes. Wouldn't you rather use your pack's juice for more laps, rather than trying to see how hot you can make your motor? Wouldn't you like to have more time to move to the front? (If you're thinking, "But that's more time for someone to knock me out of first," then tough. There are seven guys behind you who want to see you go down!)

I don't expect to see longer races happen "officially" anytime soon, but there's no reason your local track has to be slavishly devoted to ROAR rules. Nor does every class have to have longer races; I'd be happy just to see a "10-Minute Stock Class" offered at my local race place, and all the other classes can stick with 5-minute quals. If you're racing minis, running longer definitely makes sense. The cars have the run time—so use it!

Or maybe I'm just crazy.

In this issue

THE WORLDS! TWO OF 'EM! Lots of racing action this month, with big upsets at IFMAR's On-Road Electric Worlds in Kissimmee, FL, and at the Nitro On-Roads in Brazil. Familiar favorites and new names battled for blacktop supremacy, and we've got 16 pages of race coverage to prove it!

ULTIMATE TEST: ASSOCIATED TC4. All the usual Track Test stuff, plus an interview with designers Cliff Lett and Torrance DeGuzman and setups from Barry Baker and John Levanen. Plus a few other surprises; you'll just have to see for yourself.

HOW TO: GET SHAFTED. Pull-starter cord break again? Maybe it's time you upgraded to a shaft-starter. We show you how, step-by-step.

See you in thirty,

Peter Vieira
Executive Editor

The 2005 *RC Car Action Buyers' Guide* is just about ready to head out the door, and it's our biggest ever—over 1,400 listings covering the entire spectrum of RC stuff! You name it, it's in here—and in color! Motors, batteries, engines, fuel, cars, trucks, radios, accessories ... you'll find them all in the *RC Car Action Buyers' Guide*, plus comparison charts and how-to-choose articles to help you pick the best gear for you. Look for it on newsstands everywhere on March 8, 2005.

RADIO CONTROL car action

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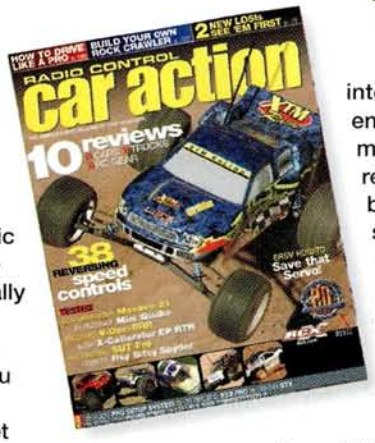


More electric

I agree with your "Starting Line" in the January issue 100 percent, but I think it would help the electric scene if you just covered it more. Practically all the vehicles you review are nitro-powered, even though you guys make *RC Nitro* magazine. Why not let Nitro cover nitro and make *RC Car Action* 100 percent electric? [email]
Ray Hand

When it comes to review vehicles, we get what we get. If the manufacturers start cranking out more electrics, that's what we'll review. For now, it looks as if nitro is still king, especially nitro monster trucks. But as I said in "Starting Line," electric RC is still a big part of the scene, if not the red-hottest.
—Pete

Welcome to Mini Mart

First off, I'd like to thank you guys for putting out a great magazine. I have learned a lot from it over the years. I was wondering if you have any plans for a mini-only section, especially now that there are so many players involved in the game. You could call it "Mini Mart" or something like that. My 8-year-old daughter and 7-year-old son have Team Losi Mini Ts, and I have to tell ya, they love 'em. Gotta start them out young like I did. I also have an XRAY M-18. I love these little vehicles, as do many of your readers, I imagine. Keep it coming! [email]
Graeme Blenkarn
Chilliwack, BC, Canada

Hmmm ... "Mini Mart." Sounds more like a convenience store, but I like the concept! If this latest minicar boom has staying power, you just might get your wish!
—Pete

Or, you could just get a 4WD buggy

I have a Traxxas Bandit and want to know whether there's a way to convert it into 4WD. Even though there isn't enough space on the 2WD buggy, my idea is that when it's 4WD, the rear slipper clutch won't have to be as big, and because less space will be taken by the new clutch, I could possibly put a hole in the rear shock tower and then put the battery tray in that spot. Do you think this idea would work? [email]
Tyler

Sorry T, there's just no sensible way to convert your Bandit. First, you'd need an entirely new front end from a 4WD buggy, which wouldn't be a direct fit in any way. Even if you could simply bolt it on, it would cost more than your entire Bandit. And even then, you'd have no way to power it; the Bandit's transmission doesn't have a provision for a belt or driveshaft. If you really want a 4WD buggy, I suggest you get

a Tamiya Baja King or Gravel Hound kit and just transfer your Bandit radio gear to your new ride.
—Pete

Rock smashes spur gear

I just started in the hobby, but I've been a scale modeler for five years. I bought a Tamiya TT-01 about three months ago and run it regularly. Since the first time I ran it, it has run smoothly, but it makes a noise like a nitro car (but not as loud, of course). I disassemble and clean it regularly and put sufficient grease on the mechanical parts, but it still makes this horrible noise. Please help! [email]
Francis
Rockaway, NY

Email us at readerswrite@airage.com, or put the postman to work by mailing your letter to Readers Write, 100 East Ridge, Ridgefield CT 06877-4606 USA. Please include your city and state, and let us know if we may publish your email address. We can't reply to every letter and email, but we read 'em all!

Ordinarily, I would forward this to George Gonzalez for "Troubleshooting," but this one's a quickie. I'm pretty sure there's a tiny pebble caught in the spur gear or pinion. Look closely between the gear teeth and use a hobby knife to pick out anything you find caught in there. That should quiet things down.
—Pete

TURNING .18

I just read your article on the best .18 engines (".18 Engine Shootout," December 2004) and loved it. My Triple-XNT has a Mugen MT12 in it and is really fast. However, I have a need for speed. What is the largest engine I can put in the truck? I live off a 16-year-old's budget (but I do have a job). [email]
Steve Welsh

Any small-block will fit your truck, including the .18s we tested, but how much power can you really put down? If a bigger engine will make your truck flip over harder or spin out more easily, it isn't worth the upgrade. If you just want to be the king of top speed, that's a different story. Don't forget to gear up!
—Pete

TRXstatic

I have been searching the Internet for the horsepower ratings of a Traxxas 2.5 engine. It amazes me how a .15 small-block mill can move trucks like the T-Maxx and the Revo. That tiny little engine barely seems to struggle. Do you know of anyone who ran a dyno test on this thing? [email]
David Pistner

RC Nitro dyno'd the TRX 2.5 back in the April 2003 issue. It maxxed out (no pun intended) at 1.33hp at 30,200rpm with a practical rpm range of 4,000 to 41,000 and peak torque of 44.1 oz-in. at 28,800rpm. In English? It's the most powerful original-equipment RTR .15 engine available.
—Pete

YOU SAID IT

"RC helped me in school"

Hi, my name is Trevor Nordberg; I am 14 years old, and am in 9th grade. I just wanted to tell you guys at *RC Car Action* (my favorite RC car magazine) that RC helped me a great deal in school. I did a science fair project with my friend Spencer Merchant on cars and what tires you should buy for your real car for different types of terrain. The way we tested this was with my T-Maxx, and I am proud to say that we received an "A" on the project and were second in the class! [email]
Trevor Nordberg
Brooklyn Park MN
nordberg.trevor@comcast.net

Good job, Trevor and Spencer. OK kids, show this to your parents and let them know that they're holding you back in school by not buying you an RC car.
—Pete ■

Every month, "Readers Write" sponsor Team Trinity awards the "You said it" letter writer the Reference body of his choice. This is the Reference Nitro Racing Truck.

Trevor behind the wheel.

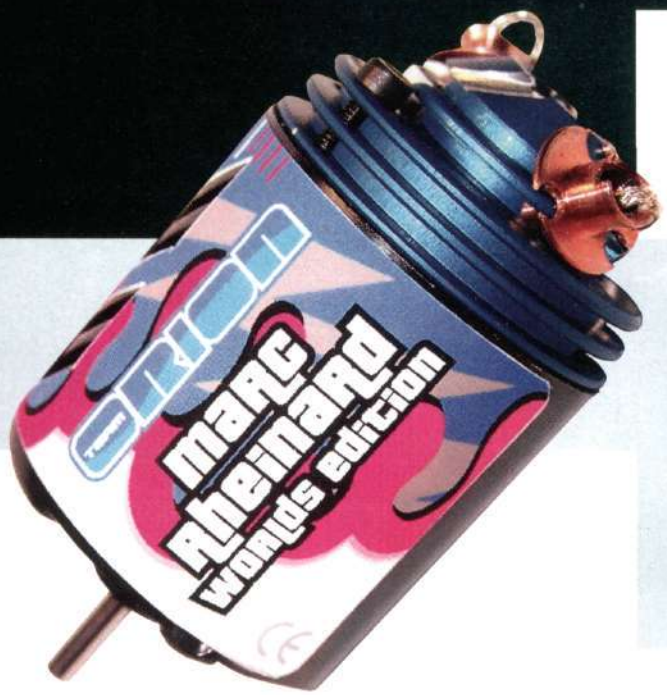
HRP HPI Savage SS Special Edition

We like that HPI sells a no-radio kit version of the Savage, but a lot of you monster guys wish you could also buy it minus the engine and exhaust. Wish granted: HRP Distributing and HPI got together to offer the Savage SS Special Edition. HRP lifts the stock SS .25 engine and tuned pipe and lowers the price of the kit accordingly, so you'll have more change for your favorite aftermarket engine and pipe setup.
HRP Distributing Inc. (800) 622-7223.

Novak Electronics Micro GT

Minis are hot right now, and Novak Electronics' newest micro speed control is aimed directly at the pint-size class. The new forward-only Micro GT is for use with any 4- to 7-cell, 1/24- or 1/18-scale cars and trucks, and it will also work with any 380-size micro-motor. You think that the Micro GT looks familiar? It should; it's a souped-up racing version of Novak's Spy Micro Reversible ESC. Novak says it has a lower "on" resistance and higher rated current than the Spy, so it's more than capable of providing faster speeds and longer run times. Finally, the Micro GT includes the same standard features as all of Novak's other speed controls—One-Touch Set-Up, Radio Priority Circuitry, Polar Drive Technology and Thermal Protection.
Novak Electronics Inc. (949) 833-8873; teamnovak.com.

POWER ZONE



Team Orion Marc Rheinard Worlds Edition Motor

Team Orion proudly introduces the new Marc Rheinard Worlds Edition Revolution motor. Each is built according to precise specifications by pro racer Derek Furutani at Team Orion's USA headquarters and is then tuned with Team Orion master motor builder Oscar Jansen's exclusive Worlds setup. For maximum power delivery, every Rheinard Edition motor is equipped with Sprint-compound Edge brushes and new, 10-coil, 0.35mm, Inox steel brush springs. The motor is available in six race-developed winds (including Marc's world-championship winning 7x1) and comes with a blue-anodized endbell.
Team Orion Inc. (714) 694-2812; team-orion.com.

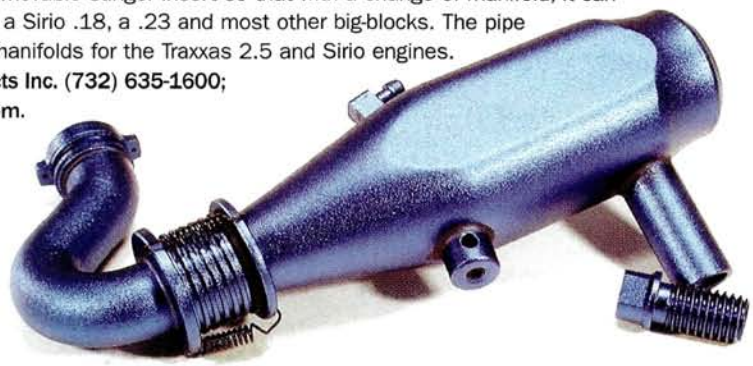
insidescoop

Sirio .23 Engine Mount and Manifold for Revo

Want to slap Sirio's baddest big-block into your Traxxas Revo? Well, now you can, thanks to this engine mount/exhaust manifold combo. It replaces the center section of the stock two-piece engine mount so that you can bolt in the wider .23 engine. The exhaust header adapts the Sirio .23's big-block exhaust port to the stock tuned pipe. The exhaust manifold also fits standard big-block engines, and it will be available separately for those who want a larger-diameter high-performance manifold for use with the Traxxas and other big-block conversion kits. **Sirio; distributed by Trinity Products Inc. (732) 635-1600; teamtrinity.com.**

Trinity High-Flow Super Pipe for Traxxas Revo

It's designed for maximum power and grunt, and Trinity claims that its new Revo pipe makes more power than the stock Traxxas exhaust system. The pipe has a removable stinger insert so that with a change of manifold, it can be used with a Sirio .18, a .23 and most other big-blocks. The pipe comes with manifolds for the Traxxas 2.5 and Sirio engines. **Trinity Products Inc. (732) 635-1600; teamtrinity.com.**



Hudy Starburst Buggy Wheels

Hudy's new 41mm 1/8-scale buggy wheels have a split 6-spoke design that prevents the insides of the wheels from being clogged with dirt and becoming unbalanced. They're made of a tough plastic blend and are the stock wheels for the XRAY XB8. Bonus: the Starbursts also look way more stylish than dish wheels. Hudy Special Products; distributed by RC America (214) 744-2400; hudy.net.

>>>PIT BOX

RD Racing products
Revo starter box

RD Racing offers a new starter box that was engineered specifically for the Traxxas Revo. It has been race tested and tweaked to ensure perfect starter-wheel-to-flywheel alignment (regardless of steering-servo configuration). RD tells us that whether you run a steering-servo guard on the right or left or run without one, you'll be able to drop the Revo right into place. The starter comes wired and assembled and will accept a standard 12V gel-cell battery (not included). Other features include: a dual 550 motor design with a replaceable starter wheel; external charging jacks; and a carrying handle.

RD Racing Products (208) 777-4076; rdracingproducts.com.

Team orion
Marathon 1400mAh receiver pack

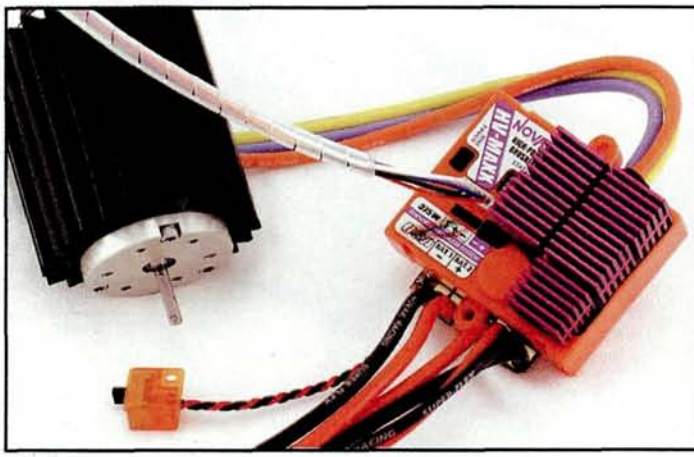
Team Orion tells us that its new receiver packs are assembled using the latest, highest-quality NiMH cells and materials. Built with a variety of applications in mind, the long-lasting Marathon 1400 packs are offered in six optimized configurations equipped with 20-gauge wire and a universal plug for serious racers and fun runners.

Team Orion Inc. (714) 694-2812; team-orion.com.

Protoform
Dodge Intrepid R/T

According to Protoform, this new-generation "medium-downforce" Dodge body is shaped to give great turn-in and balance without sacrificing straight-away speed. A small spoiler is molded into the deck to stiffen the body's rear, and an add-on spoiler increases rear downforce. Unique are its two molded-in trim lines that make mounting easier (one is for capped-tire racing, and the other is for foam-tire racing). The Intrepid R/T includes a full decal sheet, window masks, spoiler hardware and overspray film.

Protoform; distributed by Pro-Line (909) 849-9781; pro-lineracing.com.



Novak HV-Maxx available now!

By the time you read this, Novak's HV-Maxx system for the Traxxas E-Maxx, Kyosho Twin Force and other similar big-power applications should be on dealers' shelves—and with a few features we haven't seen before. For additional convenience, Novak includes a Power-Boost ESC fan and mounting bracket for those who want extra ESC cooling. Novak includes a dust cover for the empty motor location on the truck's motor plate where the second motor was installed. Your speed and run times will vary according to your battery type, but Novak says that in a basic E-Maxx setup, the HV-Maxx is capable of 32 to 38mph.

Novak Electronics Inc. (949) 833-8873; teamnovak.com.

Venom Racing DC Multi Charger

You can't get any simpler (or cheaper!) than this new Venom DC Multi Charger. The little green DC machine is easy to use and can charge 5-, 6- and 7-cell NiMH and Ni-Cd stick packs and receiver packs. It comes wired with a standard Tamiya-type connector and, best of all, it costs only about $20.

Venom Racing (800) 705-0620; venom-racing.com.

>>>PIT BOX

Team Losi
Titanium-Nitride LST Gears

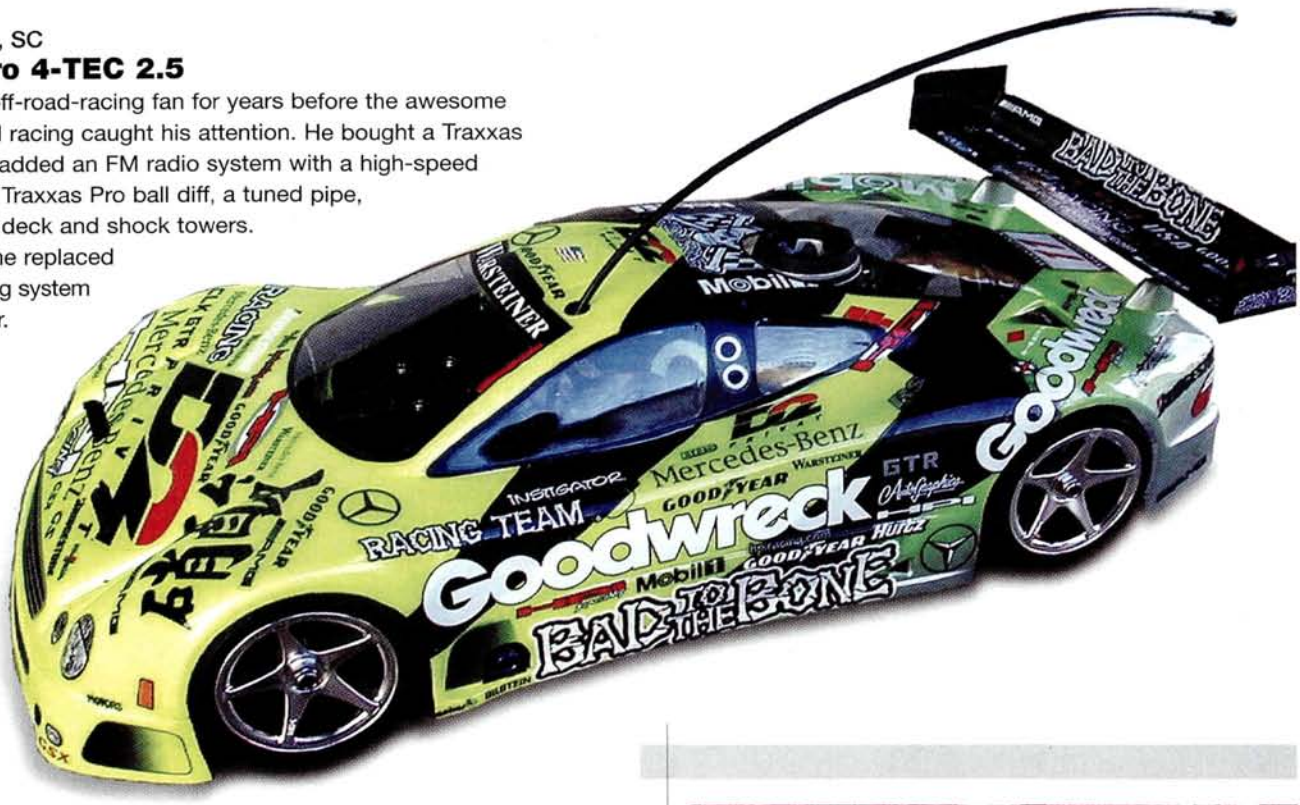
It's so easy to beef up your LST's drivetrain with Team Losi's new, heavy-duty clutch and 2-speed, hardened-steel, titanium-nitride-coated gears. The gears are direct replacements parts and were designed for serious thrashers who run their trucks in the worst conditions. The gears are made of steel, and every effort was made to minimize weight, so they're only slightly heavier than the stock ones. The gears are sold separately and in a convenient package deal.

Team Losi; distributed by Horizon Hobby Inc. (800) 338-4639; teamlosi.com; horizonhobby.com.

Wil Dial › Liberty, SC

Traxxas Nitro 4-TEC 2.5

Wil was a huge off-road-racing fan for years before the awesome speed of on-road racing caught his attention. He bought a Traxxas Nitro 4-TEC and added an FM radio system with a high-speed steering servo, a Traxxas Pro ball diff, a tuned pipe, a graphite upper deck and shock towers. To save weight, he replaced the electric starting system with a pull-starter.



Derek Howard › Pasadena, CA

Custom Rover

Derek's Soduro (Solar Dust Rover) caught our eyes right away. It's designed to travel over rough terrain and operates using solar power. The front and rear halves of the Rover were donated by a Traxxas Rustler, and the center section was custom-made by Derek out of aluminum and polycarbonate. It features 6 aluminum shocks for plenty of suspension travel and rolls on Pro-Line wheels and tires. This unique and well-executed custom vehicle was an easy pick for Reader's Ride of the Month.

Darren Craft › Flagstaff, AZ

HPI Savage

One of the big advantages of owning a Savage is the enormous amount of aftermarket support for this monster truck. Darren has slowly built up his Savage with a ton of parts. The highlights include a Picco .26 engine, a horde of GPM items and New Era and Golden Horizon anodized-aluminum parts. He painted an HPI Jeep Wrangler Rubicon body to match the paint scheme from his stock Savage 21.

[READERS' RIDES]

Rob Robinson › Grants Pass, OR

Traxxas T-Maxx 2.5

Now that Rob has retired, he has quite the life of traveling around the country in his RV, and he races at various RC tracks. Pictured here is one of his Maxx trucks complete with a body that he painted as a tribute to his favorite NASCAR driver, Ward Burton.

John Carnell › Dillsburg, PA

Traxxas T-Maxx

Since he didn't have any decent off-road terrain to tear up on close by, John set up his T-Maxx for on-road action. He started off with a Pro-Line Cadillac Escalade EXT body with Road Rage tires and then added an XTM big-block conversion kit, complete with a Sirio .27 engine. Next, he added XTM aluminum bumpers, skid-plates, bulkheads and servo mounts, RC Trix aluminum suspension arms, a Robinson Racing steel spur gear and clutch bell, Hitec servos and Progressive Suspension piggyback shocks.

Vic Mitchell › Post Falls, ID

Technokit 1/5-scale & Team Associated RC10L4 Oval

There is no question who Vic roots for in the NASACAR Nextel Cup: both of his rides are painted replicas of Jeff Gordon's DuPont Chevrolet. On the right is an RC10L4 oval setup with a Peak mod motor, a Venom 3000mAh battery pack, a Novak Atom ESC and a Hitec steering servo. The giant 1/5-scale is powered by a Zenoah G230 gas engine with a K&N air filter, and it's protected by a Venom fail-safe unit. Vic couldn't resist; the even added a detailed driver whose foot moves with the throttle.

George Zaragoza › Lancaster, CA

Tamiya Bruiser

Even though George hates his team, this Raiders ride is still his pride and joy. He lifted the Bruiser's leaf suspension to add ground clearance and made an aluminum roll bar so he could mount functional spotlights. A 4-channel radio with a Novak Super Rooster ESC controls power to a mild modified motor, which in turn, drives the meaty Pro-Line Masher tires. ■

SEE YOUR RIDE IN READERS' RIDES!

We want to see what you're driving! Email your 300dpi TIFF or JPEG images to readersrides@airage.com, or send color prints (no Polaroids, please) to Readers' Rides, 100 East Ridge, Ridgefield CT 06877-4606 USA. Be sure to write your name, address and phone number on the back of each photo. Submissions will not be returned; we keep them to stick on the fridge.

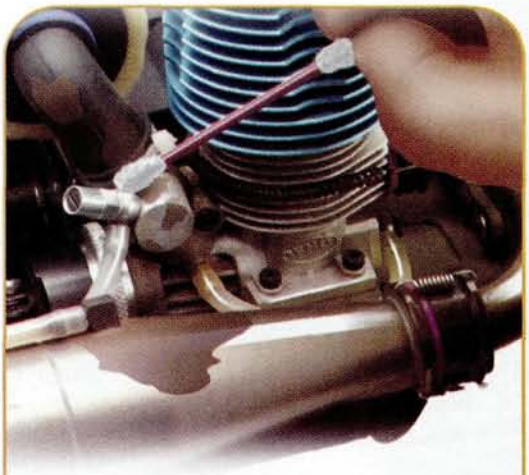
PIT TIPS

BY GEORGE M. GONZALEZ › ART BY RICHARD THOMPSON

OUR TIPS › YOUR TIPS › PRO TIPS

Easy-access laydown servo

My OFNA X1-CR's laydown steering servo helps lower its CG, but the position also makes it difficult to access the servo horn's mounting screw because of interference from the chassis' mudguard (this is a problem for most other buggies with laydown steering servos as well). To improve access, I drilled a ¼-inch-diameter hole in the right mudguard so I can pass the tip of my screwdriver through the mudguard to reach the servo-horn mounting screw.

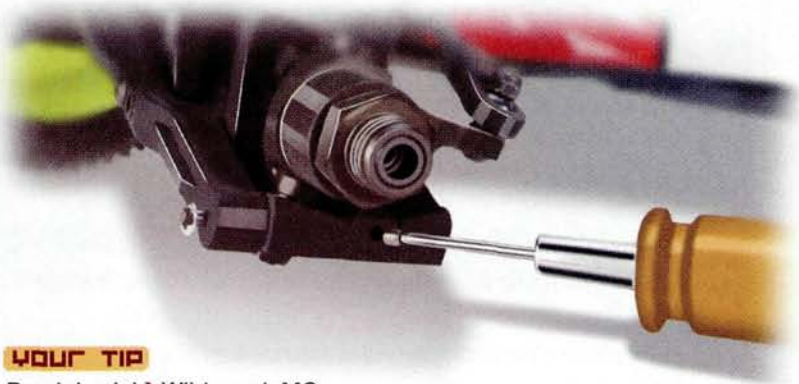


YOUR TIP

Andrew Peterson › San Luis Obispo, CA

Q-Tips tips

Cotton swabs are a great addition to your toolbox. You can use them to clean hard-to-reach areas on your car, like around the base of the carburetor and between wheel spokes. They're also great for cleaning out brush hoods and applying comm drops.



YOUR TIP

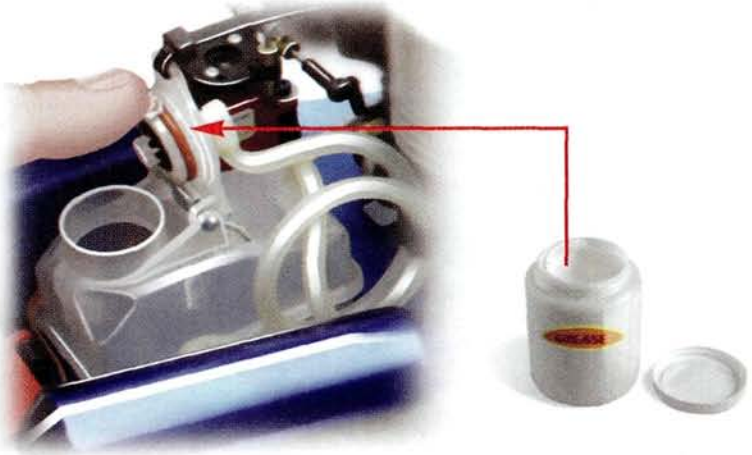
Derek Lasini › Wildwood, MO

No more E-clips

Instead of relying only on E-clips to keep your car's hingepins in place, add a 4-40 setscrew for extra security. To do this, drill a hole in the arm mount or hub carrier (whichever part has more "meat") so the setscrew will intersect the hingepin bore, and drill the hole slightly smaller than the setscrew so it will thread properly. Next, grind a flat spot on the hingepin where the setscrew pinches it, and assemble the parts so the setscrew tightens against the flat. No more lost hingepins!

Nickel-and-dime ride-height gauge

Forgot your ride-height gauge? No problem; you can use the change in your pocket to adjust your touring car's ride height. For asphalt, most racers set up their cars with a 5mm ride height. A stack of three quarters or four dimes equals 5mm. Set up the stack of coins, and lower or raise the ride height until the chassis just grazes the coins as it rolls over them.



YOUR TIP

Bruce Dozier › Springfield, MA

Improved fuel-tank lid seal

The quick-fill caps on some fuel tanks won't close or seal completely when the rubber O-ring inside the cap is new or just dry. Some lids are adjustable; if yours isn't, apply a little grease to the O-ring to allow the cap to close completely and provide a better seal.

YOUR TIP

Matthew Steinbeck › St. Louis, MO

Magnetized parts bowl

There's nothing worse than losing a screw, E-clip, or other small metal part when you're wrenching on your car, so Matthew uses a magnetized parts bowl from Sears to hold small parts when he works on his gear. Make your own magnetized bowl in any size by adding a stick-on magnet (available from the craft store) to the bottom of any metal container. You can also use the magnetic container to find lost parts when working over a carpeted floor. Just slide the magnetic base over the carpet until it grabs the missing item.

Vent for better handling

The vent holes drilled into most monster truck rims are too small, so they don't allow the air to vent out fast enough when the vehicle lands from a jump or runs over obstacles. This can cause the tires to bounce excessively when going over bumps (instead of absorbing the impacts), which leads to erratic handling. Enlarging the holes slightly or drilling a few more similar size air-vent holes will help the air escape faster, and that will improve your truck's handling. A tapered reamer works great for enlarging the vent holes in the plastic rims.

YOUR TIP

Mason Jennings
› Tarzana, CA

Long-lasting glow-plug starter

Nothing beats the convenience of a rechargeable glow-starter, unless you forget to charge it. As a backup, keep a 1.5V lantern battery and model-airplane-type "remote" glow starter in your pit bag. The glow starter clips to the battery with alligator clips, and one lantern battery can easily last a full six months of weekend racing. ■

CLICK TRIP
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We screen all Pit Tips for functionality, feasibility and safety but do not test them all. *RC Car Action* is not responsible if you mess up your gear or yourself by using the tips given here. If you aren't comfortable following any tip we show—DON'T!

TROUBLESHOOTING

BY GEORGE M. GONZALEZ

YOU'VE GOT PROBLEMS › WE'VE GOT FIXES

Melted body

Q I'm very pleased with my HPI Nitro MT-2 4WD stadium truck. I live in the low desert where temperatures can rise above 115 degrees in the summer. I cut extra cooling holes in the body and installed a big aftermarket cooling head, and that helped deal with the heat. The only problem is that the body fits so tightly on the chassis that it rubs against the optional HPI aluminum tuned pipe I installed, and that causes the body to melt. I've cut the body around the tuned pipe, but that takes away from the truck's scale looks. Are there other bodies that will fit on my truck and won't rub? [Email]
Kirk Grassler

A With some creative trimming and mounting techniques, I'm sure you'll fit most 1/10-scale nitro stadium truck bodies on the MT-2. The cheapest and probably most effective remedy, however, is to stick a couple of strips aluminum tape along the inside of the body where it contacts the exhaust pipe. The aluminum will dissipate the heat created by the hot pipe and help protect the body from melting. A roll of aluminum tape at your hardware store costs less than $5.

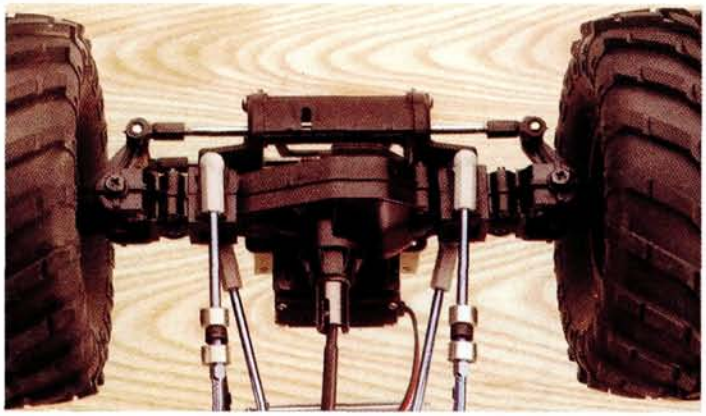
Apply a couple of layers of aluminum tape along the inside of the body where it makes contact with the pipe. The tape will act as a heat barrier and prevent the body from melting.

Crash-proof 4-link suspension

Q I modified my Tamiya TLT-1 for rock crawling. I installed longer suspension links to increase the wheelbase, locked up all three differentials and used longer CEN MT-2 dogbone driveshafts to link up the diffs. The truck scales over rocks and other obstacles with little trouble, but I keep breaking the plastic axle cases (diff housings) at the points where the axle stays are attached. I've seen some outrageous TLT-1 rock crawlers on the Internet and wonder whether anyone has experienced the same problem. Do you know of a way to strengthen the diff housings?

Jacob Naylor
Flagstaff, AZ

A Your truck probably has a lot more suspension articulation than the stock setup, and that is causing the suspension-link rod ends to bind inside the aluminum suspension stays. The binding that occurs when the suspension twists from side to side places a great deal of stress on the plastic diff housings. Instead of using the suspension stays, install ball joints on the diff housings and ball cups on the ends of the suspension links. The ball-and-cup suspension-link connection will allow freer suspension movement, and the ball cups will pop off the ball joints instead of cracking the axles when you've pushed your truck a little too far.



Above: using ball joints and ball cups to attach the suspension links will increase suspension articulation and eliminate binding. As a safety feature, the ball cups will pop off the ball joints if the suspension is twisted too far, and that will prevent the plastic diff cases from cracking.

Left: with some time and a few bucks saved up in your piggy bank, you can build a custom TKT-1 rock crawler like the one shown here. If you'd like building tips, email me at georgeg@airage.com. If I get enough requests, I'll convince the chief to let me write an "Ultimate TLT-1 Rock Crawler" article.

After you make a few vent holes, you'll be able to spin the tires dry.

Wet tire foam

Q I'm new to the hobby and recently purchased a Traxxas T-Maxx 2.5. I made a mistake and ran the truck in mud, and it took nearly two hours to clean it up afterward. I thought that soaking the tires in soapy water would make cleanup easier, but I didn't realize that there are holes in the rim and that water can get inside. Needless to say, water has gotten inside the tires and soaked the inner foams. Now I have a set of water-logged Pro-Line Dirt Hawg tires that spin out of balance and wobble violently when I peg the throttle. The engine is also struggling because the wet tires weigh a ton. Is there any way to dry the foam inside the tires? (Email)

Jason Michaels

A It's a common mistake that has happened to all of us at least once. Never submerge tires in water, or ... well, you know what happens.

First, enlarge the rim's vent holes slightly with a tapered reamer or hobby knife, and make additional vent holes in the outer surface of the tire—three evenly spaced holes are all you need. Next, squeeze out as much water as you can using your kung-fu grip. You can get a surprising amount of water out just by squishing, but there's still plenty of H_2O to go. Mount the tire back on your truck, put the truck on a stand so its wheels can turn freely, and fire it up. Goose the throttle to spin the wheels, and watch centrifugal force go to work as the water is flung out of the tires' vent holes (and all over you; stand back when you do this!).

Your tires should now be dry enough to mount, but if you want them to be completely dry, just let them bake in the sun for an afternoon.

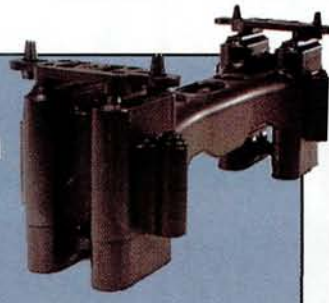
Not enough run time

Q I just bought a DuraTrax Mini Quake truck, and I'm very pleased with its design and construction. The truck runs great, but the run times are less than I expected. The included 6-cell battery pack provides 6 minutes of run time at the very best. I also want it to accelerate faster. I tried to find a battery pack with more capacity, but none of the packs at the hobby shop fit inside the battery tray. It also didn't have any modified motors that could be bolted to the truck. Do you know of any battery packs and mod motors that will work on the Mini Quake? [Email]
Jamie Mellows

A DuraTrax offers an 1100mAh NiMH battery pack for the Mini Quake (item no. DTXC2195) that should double your run time. If you're looking for more acceleration, replace the truck's 16-tooth pinion gear with a DuraTrax Mini Quake 13-tooth pinion (DTX8349). Your truck will accelerate quicker, and you'll also notice an increase in run time because of the lower gearing. Kyosho offers a couple of 380-size, low-turn mod motors for its Hanging On Racer scale motorcycle that you can bolt right onto the motor mount. You'll gain plenty of speed with a mod motor, but run times will decrease considerably.

DuraTrax offers an 1100mAh battery pack for the Mini Quake that will provide much longer run times than the stock 600mAh battery pack. The optional 13-tooth pinion will provide more than 10 minutes of run time and decent scoot to boot.

TOOLBOX



Trinity Monster Stand

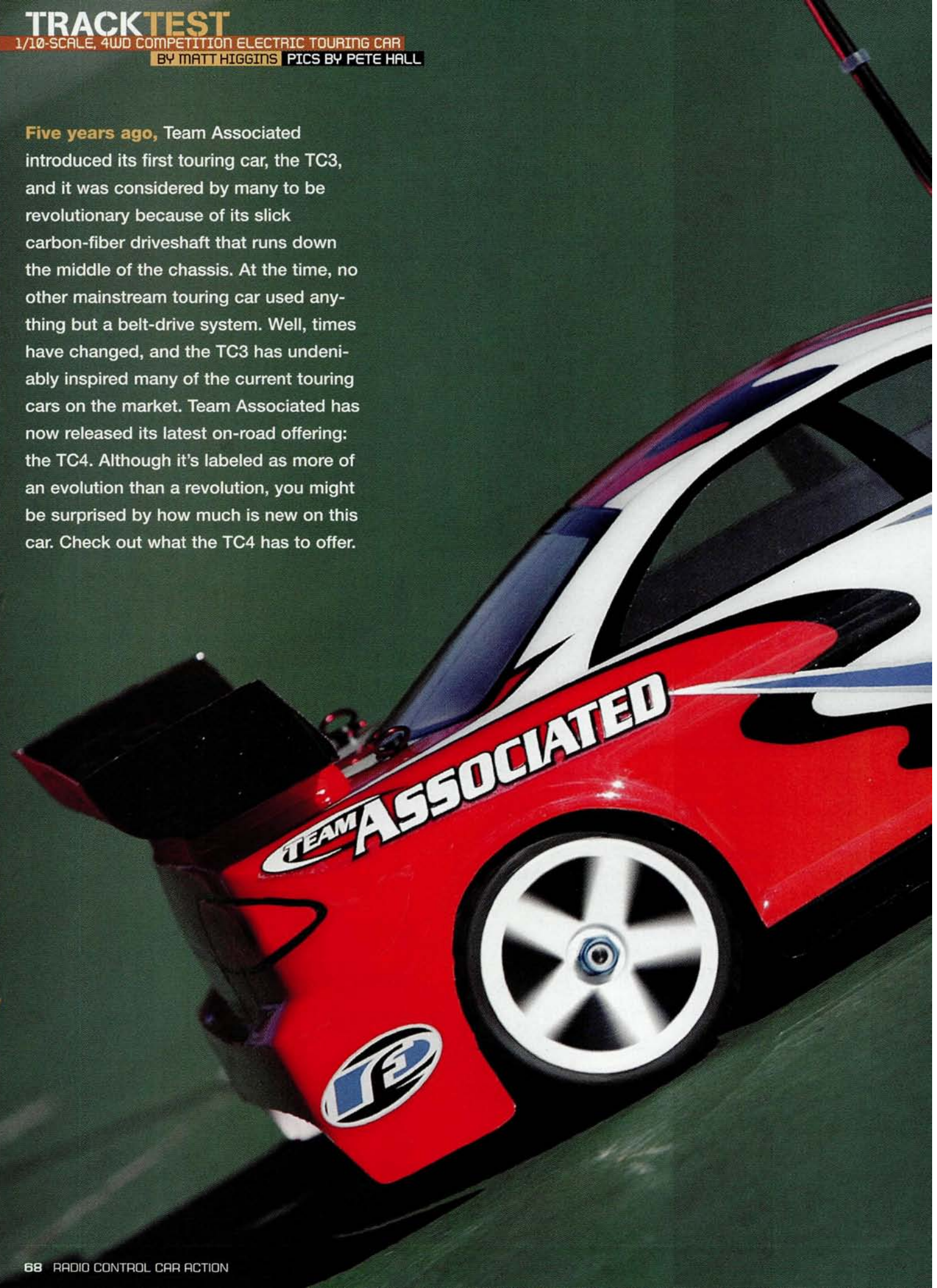
Trinity's Monster Stand is made of high-impact composite to make it light, fuelproof and rugged—perfect for 1/8-scale monster trucks and buggies. Removable legs allow you to adjust height, and separate platforms allow length and width adjustment to accommodate 1/10-scale trucks, buggies and touring cars. The adjustable pegs lock onto your vehicle securely to aid in engine tuning and general wrenching.

Trinity Monster Stand—TRI30008; $39.99
Trinity Products Inc. (732) 635-1600; teamtrinity.com.

Send your "Troubleshooting" questions and comments to troubleshooting@airage.com, or mail them to "Troubleshooting" c/o *RC Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

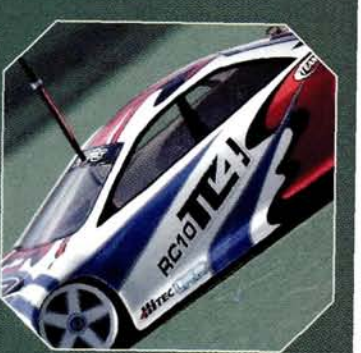
BY MATT HIGGINS PICS BY PETE HALL

Five years ago, Team Associated introduced its first touring car, the TC3, and it was considered by many to be revolutionary because of its slick carbon-fiber driveshaft that runs down the middle of the chassis. At the time, no other mainstream touring car used anything but a belt-drive system. Well, times have changed, and the TC3 has undeniably inspired many of the current touring cars on the market. Team Associated has now released its latest on-road offering: the TC4. Although it's labeled as more of an evolution than a revolution, you might be surprised by how much is new on this car. Check out what the TC4 has to offer.



Team Associated TC4

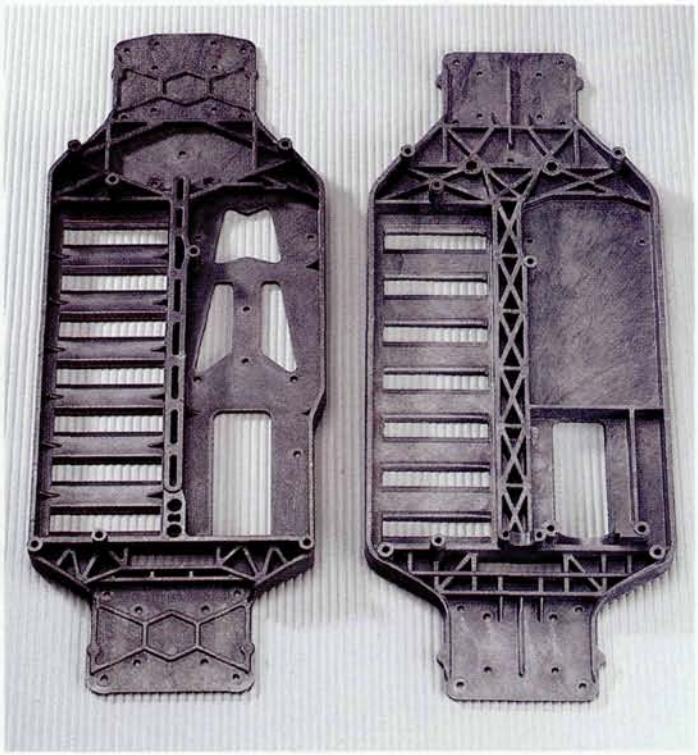
The A-Team's Latest A-Main in a Box



KIT FEATURES

CHASSIS. The new chassis may look similar to the one on the TC3, but the molded-plastic, fiber-reinforced piece is an entirely new design. The layout is essentially the same: batteries on the left, the rest of the electronics on the right and a shaft that runs down the middle. The most obvious difference between the TC3 and TC4 chassis is in their center ridges (spines). This ridge significantly stiffens both chassis designs, but the TC4's ridge is approximately 6mm narrower and 4mm taller. This allows the batteries to sit closer to the chassis' centerline for improved transitional handling, so it will handle better through chicanes. Many racers have ground away half of the TC3's ridge to position the battery closer to the center. The new chassis offers the same result without compromising chassis strength and rigidity.

Another popular modification to the TC3 chassis has been to round and smooth out the outer edges of the bottom of the chassis, but the TC4's edges are already rounded. This reduces



When they're side by side, the differences between the TC4 (left) and the TC3 chassis are apparent.

BUILDING AND SETUP TIPS

Team Associated is well known for its excellent instructions, and the TC4's are no exception, so I was surprised not to find a blank setup sheet and basic setups for common tracks. (Don't worry; the A-team should have these online by the time you read this and they will be included in future TC4 kits.)

REMOVE BURRS FROM THE GEARS. Use a light touch and a hobby knife to carefully remove any burrs you find on the gears. The small drive-pinion gears sometimes have flashing, and that's noted in the manual, but the larger differential ring gears are also likely to have flashing. Remove it carefully so that the bearings can be properly seated.

PREP THE FOAMS. Drop the VCS foams into an empty parts baggie, squirt shock fluid in there, and mush it into the foams without getting your fingers all gooey.

STOP TWEAK. To get the TC—or any touring car, for that matter—to handle properly, make sure that all the shocks are exactly the same length. One of the most accurate methods is to use calipers.

PRECISE ROLL-CENTER SETUP. The TC4's vertical ball studs make it easy to alter roll center: just stack washers under them. Even better than washers are Take-Off's precision aluminum spacers.

DROOP-SCREW INSTALLATION. Screw the large droop screws into the suspension arms as straight as you can. It will make adjusting droop much easier.

BAG C, STEPS 3 & 5. Use the short posts for the swing rack in step 3; use the long posts in step 5 for the bell-crank.

BAG D, STEPS 2, 4, 6, 8. The arm-mount shims come in three thicknesses; they aren't labeled as such, but Associated did make it easy to distinguish them. The thinnest shim (0.025 inch) has one nub protruding from the center; the thicker shim (0.050 inch) has two nubs, and the thickest shim (0.75 inch) has three nubs.

BAG D, STEPS 3 & 7. Carefully remove any burrs from the hingepin pivot balls. This will ensure a bind-free and consistent suspension movement when you've finished.

BAG E, STEP 3. It's hard to tell from the illustration, but the order of assembly for the front input shaft is: bearing, thin shim, dowel pin and drive cup.

BAG E, STEP 6. Make sure that the bearing is fully and evenly seated in the input bearing housing.

> "Team Associated really hit one out of the ballpark with the drivetrain ... It's efficient, extremely durable and virtually maintenance-free.

The TC4 motor mount is now a separate aluminum piece. It's a more secure mount, and it also significantly helps to dissipate heat.

SPECIFICATIONS

MANUFACTURER
Team Associated
MODEL TC4 Team kit
SCALE 1/10
PRICE $210
Varies with dealer

DIMENSIONS
Wheelbase 10.18 in. (259mm)
Width 7.5 in. (190mm)

WEIGHT
Total, as tested 53.75 oz. (1,524g)

CHASSIS
Type Molded semi-tub
Material Fiber-reinforced, composite-plastic

DRIVETRAIN
Type Shaft-drive 4WD
Primary 19T pinion/72T spur gear
Transmission ratio 2.5:1
Final drive ratio 9.47:1
Driveshafts MIP CVDs
Differentials Ball with D-shaped rings and plastic outdrives
Bearing type Rubber-sealed ball bearings

SUSPENSION
Type Lower A-arms with adjustable upper camber links
Shocks Fluid-filled, threaded, aluminum-body

WHEELS
Type Yokomo white dish

TIRES
Type Deeply treaded rubber tires with foam inserts

ELECTRONICS
Transmitter/receiver Not included
Servo Not included
Speed control Not included

The new steering system is supersmooth, and there isn't any risk of its getting fouled by track debris.

FACTORY OPTIONS

- **Full carbon component set–item no. 31042**
- **Forced-air motor-cooling system–31037**
- **Lightened-steel outdrives–31062**
- **Factory Team blue screw kit–31054**
- **Front and rear anti-roll bar kit–31057**
- **Factory Team hard-anodized, threaded shock kit–3985**
- **Blue, graphite battery brace with chrome decal–31039**

Partial list; additional options available.

LIKES

- **Extremely adjustable.**
- **Fantastic handling with minimum effort.**
- **Easy to assemble.**
- **Tires included ...**

DISLIKES

- **... but they're more for play than racing.**
- **No setups included with instructions.**

The inner camber-link mounting points are now built into the chassis braces. Vertical ball studs allow more precise roll-center adjustments.

friction when the chassis scrapes against something during hard cornering. If your chassis isn't so low that it ever so slightly drags on some corners, slam that thing! What are you running? Off-road?

The TC4's chassis also has large cooling holes on its right side. The cooling hole under the motor is significantly larger, and an optional forced-air duct system provides more airflow to the motor.

Up front, the beefed-up bumper design from Associated's nitro touring car has found its way onto the TC4. The upper and lower deck sandwich the foam bumper and keep it in position through even the worst crashes. Associated wisely uses a flexible and impact-absorbent plastic for the bumpers. The TC3's small rear bumper was not carried over to the TC4.

DRIVETRAIN. Team Associated really hit one out of the ballpark with the drivetrain it originally developed for the TC3. It's efficient, extremely durable and virtually maintenance-free, but the A-team incorporates several noteworthy improvements in the TC4. The transmission drive cups have been redesigned and are now much more durable. The rear input shaft's outer bearing has a new bulkhead that eliminates the possibility of your over-tightening it and cramping the bearing. The spur-gear hub now secures the spur gear with three screws instead of two, and it also has a larger surface area to better support the gear. At all four corners, you'll find new, heavy-duty, aluminum MIP CVDs. New star-shaped, molded-plastic units replace the traditional drive hexes. Team Associated, says that the new shape allows tighter manufacturing tolerances and a more precise fit with most standard touring-car wheels. All versions will include a light, yet tough, 6061 T6 aluminum driveshaft that is 1mm thicker than the TC3's, and according to Associated, it's three times stronger.

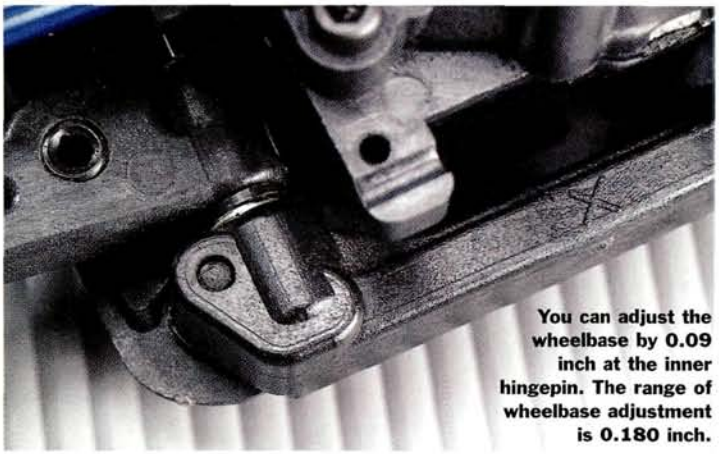
Lightweight outdrive cups are used front and back, and you'll find the TC3's transmission cases and gears on the TC4. If you're upgrading from a TC3, this is good news because the 2.5:1 internal ratio is retained, and you won't have to figure out new gearing. The sealed cases keep debris and road grime out, and the precision gears still make for one of the most efficient drivetrains in the business.

The TC4 has a new three-piece motor mount, and the lower piece is designed to increase heat dissipation and provide a more secure mount.

The TC4's molded transmission cases didn't need any hand-fitting (unlike the TC3's).

SUSPENSION AND STEERING. This is where the TC4 shows its more noticeable tweaks. The front and rear shock towers are completely new; both are more substantial and offer four upper shock-mounting holes. On the rear shock tower, the body mounts have been repositioned behind the tower and to the outside of the shock-mounting holes. This creates a much sturdier body-mounting platform. The shock towers no longer contain the inner camber-link mounts; they are now incorporated into the chassis braces. All the inner camber links are now mounted vertically for easier and much finer roll-center adjustments. Each brace offers four, inner, camber-link positions. This new setup makes the TC4 much more adjustable than the TC3.

The new, star-shaped, molded-plastic units replace the traditional drive hexes. Team Associated says that the new shape allows more exact manufacturing tolerances and a more precise fit with most standard touring car wheels.



You can adjust the wheelbase by 0.09 inch at the inner hingepin. The range of wheelbase adjustment is 0.180 inch.

Unlike the TC3's, the outer hingepins are not retained by pesky E-clips but are held in place by small screws. This design is also used on the B4 and T4.

Associated reports that the new, larger-diameter inner hingepins are 40 percent stronger. The pins are retained in a pivot-ball system that allows bind-free movement in new mounts. Anti-dive, kick-up, anti-squat and pro squat are now all adjusted with shims, and you can adjust the wheelbase by 0.09 inch at the inner hingepin. You can also now make wheelbase adjustments at the front and rear. The total range of adjustment is 0.180 inch, and any driver will be much more likely to see the results of this adjustment than with the previous design. The TC4 comes with 3 degrees of rear toe-in, but optional blocks are available to dial in 2.5 and 2 degrees of rear toe. Each outer hingepin is now held by the edge of a small screw (similar to the setup used on the B4 and T4).

The Team version of the TC4 includes threaded, blue aluminum shocks. The lower mounts now use ball cups while the upper mounts are attached by the same free-moving plastic bushings as you'll find on the TC3.

The new steering system is very similar to the Nitro TC3's. It rides on ball bearings and, as a result, is incredibly smooth. Unlike the old system, it is also much less likely to get fouled by track debris. The steering hubs now have two mounting holes for the steering links to adjust Ackerman.

BODY, WHEELS AND TIRES. Like many RC racecars, the TC4 doesn't include a body, so the choice is entirely up to you. I installed a Protoform Mazda 6 painted by Bill Zeger of Zegers R/C Graffixx. Associated does include wheels and tires. The Yokomo white dish rims are perfect for racing, but the deeply treaded tires and soft inserts look more like rally tires than something you might hit the track with. They will, however, probably work great on unprepared parking lots when you want to just go bomb around.

FIND IT
>>> Go to page 250 for manufacturers' contact information.

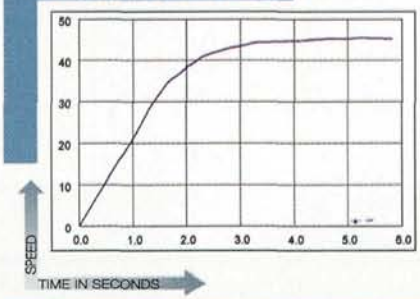
mini test

Reedy Ti Worlds Edition

With 26 world championships under its belt, Reedy modified motors are well-known for making serious speed, and the Ti Worlds edition is no exception. Reedy uses the latest C4 magnets and thick cans for increased power. Capacitors also come installed. With the recommended gearing of a 19-tooth pinion with the stock 72-tooth spur, the low-wind Ti provided absolutely ballistic acceleration and top speed. Check the steepness curve (below) to see just how hard this mill pulls the TC4 up to its 45mph top speed.

› *Performance varies with gearing, vehicle, battery and speed control used.*

RADAR TESTING



Distance (in feet) traveled in:	0-132 ft. time	Speed at 132 ft.
1 SEC. › 16.0	3.14 SEC.	43.8 MPH
2 SEC. › 62.20		
3 SEC. › 123.2	Time to top speed	Top speed
4 SEC. › 188.1	5.28 SEC.	45.3 MPH
5 SEC. › 254.1		

YOU'LL NEED	WE USED
Transmitter and receiver	Hitec SRX Aggressor FM transmitter and DCX receiver
ESC	LRP Quantum Competition 2
Steering servo	Hitec HSC-5998TG
Motor	Reedy Ti Worlds Edition
6-cell battery	Reedy Real Time 3300 NiMH cells
Charger	LRP Pulsar Competition 2
Body	Protoform Mazda 6
Racing tires	TRC Plaids and Purples

PRO DRIVER TC4 SETUPS

BARRY BAKER'S 2004 U.S. INDOOR CHAMPIONSHIPS TC4 SETUP

Surface: high-traction Ozite carpet

	Front	Rear
Shock piston	3	3
Shock fluid	70WT	60WT
Shock springs	Yellow	Copper
Shock mount (tower)	Second from innermost	Outermost
Shock mount (suspension arm)	Inner	Outer
Ride height	4.5mm	4.5mm
Tires	Jaco double Pink/Orange	Jaco double Pink
Tire size	2.25 in.	2.25 in.
Camber	-1.5 deg.	-1.5 deg.
Toe-in	0 deg.	3 deg.
Swaybar	0.055 black	None
Differential	IRS aluminum	IRS aluminum
Camber-link mount (chassis brace)	Second from innermost	Innermost
Camber-link ball-stud, washers (chassis brace)	Silver, 0	Silver, 0
Arm spacing (wheelbase)	2 back, 1 forward	2 back, 1 forward

Front circle shims	2
Front triangle shims	0
Rear square shims	0 (circle block used instead of square)
Rear X shims	1
Steering-rack ball stud	Silver
Steering-rack ball-stud washers	1
Rear upright camber-link mount	Inner

Motor	Reedy 8x2
Motor brush	Reedy 766
Motor timing	12 deg.
Gearing	100/27
ESC	LRP Quantum 2
ESC mode, drag brake, initial brake	2, 2, 2
Battery	Reedy GP 3300
Battery position	Forward
Body	Parma Alfa
Tire compound	Paragon Ground FX

JUHO LEVANEN'S 2004 IFMAR WORLD CHAMPIONSHIPS TC4 SETUP

Surface: large, flowing outdoor track

	Front	Rear
Shock piston	1	1
Shock fluid	50WT	50WT
Shock springs	Blue	Blue
Shock mount (tower)	Second from innermost	Second from outermost
Shock mount (suspension arm)	Inner	Outer
Ride height	5mm	5mm
Tires	Handout	Handout
Tire size	Not available	Not available
Camber	-1 deg.	-1 deg.
Toe-in	0 deg.	2 deg.
Swaybar	0.055 black	0.055 black
Differential	IRS aluminum	IRS aluminum
Camber-link mount (chassis brace)	Innermost	Innermost
Camber-link ball stud, washers (chassis brace)	Silver, 0	Silver, 2
Arm spacing (wheelbase)	2 back, 1 forward	2 back, 1 forward

Front circle shims	2
Front triangle shims	2
Rear square shims	4
Rear X shims	4
Steering-rack ball stud	Silver
Steering-rack ball-stud washers	0
Rear upright camber-link mount	Inner

Motor	Reedy 7x2
Motor brush	Reedy Plutonium
Motor timing	12 deg.
Gearing	76/22
ESC	LRP Quantum 2
ESC mode, drag brake, initial brake	2, 2, 2
Battery	Reedy Real Time GP 3300
Battery position	Forward
Body	Protoform Mazda 6
Tire compound	Not available

Behind the design

Before we tested the TC4, we spoke with Team Associated's Cliff Lett (a former racer and an IFMAR world champion) and Torrance DeGuzman (an accomplished RC driver who formerly worked in the aerospace industry). Lett leads Associated's design team and was the primary designer of the TC3. DeGuzman, a senior engineer, was the main designer of the TC4.

RC CAR ACTION: The TC3 is extremely successful; why did you decide to come out with the TC4?

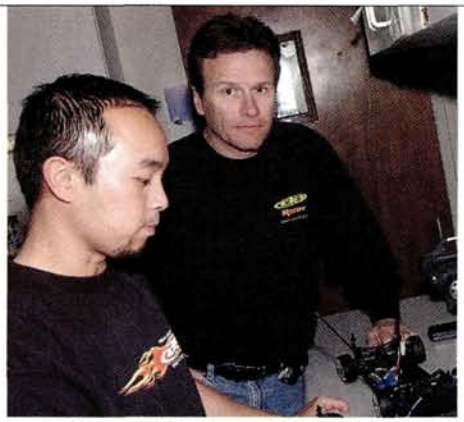
CLIFF LETT: Many of our customers and team drivers asked for a new touring car. Since the TC3 is more than five years old, we felt it was time for a significant update. Our goal was to provide new adjustments in finer increments and also to fix several TC3 parts that caused some grief: contamination of the linear steering rack, bent hingepins and unequal rear toe-in, for example. The TC3 was designed more than six years ago and tires, batteries, speed controls and motors were very different. Today's cars have more grip, much more power and run faster for longer. This results in much more stress on the entire car.

TORRANCE DEGUZMAN: The TC3 is excellent, but as Cliff says, it is more than five years old. The TC4 and TC3 are geometrically the same, but the TC4 can be adjusted in finer increments. It also incorporates the modifications that our team drivers have been making to TC3 parts: the batteries have been moved as close as possible to the centerline for equal left-to-right weight balance; the arm-mounting system now covers the whole range of setups from carpet to asphalt; we improved the TC3 parts that see most damage—namely, the hingepins and CVD bones.

RCCA: How long did it take to complete the TC4 ?

CL: If you count the TC3 and TC4, I've been working on it for the last six to seven years!

TD: It took a year to complete the TC4 design, but we continue to develop cars even after their release. So the TC4 project is still going.



Team Associated design engineers Torrance DeGuzman (left) and Cliff Lett.

RCCA: Which aspects of the TC4 design did you focus on?

TD: Adjustability, ease of maintenance and ease of tuning without losing the essence of the successful TC3.

RCCA: Which parts are you most proud of?

TD: The anti-roll-bar-adjustment system, the forced-air cooling unit and the camber-link mounting system.

RCCA: When can we expect a full Factory Team version?

CL: No comment.
TD: Ditto.

RCCA: The TC4 will be compared with the TC3. Which new features might not be immediately obvious?

TD: Inboard wheelbase adjustment front and rear; batteries moved closer to the center; stronger main drive cups; new steering mechanism; more stable body-mounting locations; new bumper mount; hingepin-capture system [B4/T4]; new anti-roll-bar-mounting system; new motor mount; 2.5-degree rear toe arm mount.

RCCA: Do you have any building tips for someone who's building a TC4?

CL: A few parts have been updated since the first TC4 kits were shipped in October—namely, the chassis braces, suspension arms, differential gears and arm mounts. Be sure you have the most up-to-date TC4 parts. Look for race-winning setups on our website: teamassociated.com.

TD: Many team drivers remove the ball-bearing seals that face inward on the transmission, hub carriers and steering blocks. Then they clean the grease from the ball bearings with motor cleaner and use a good bearing oil like Mobil 1. Do *not* remove the seals that face outward! There isn't much else that isn't covered in the instruction manual. You can bevel the lower corners of the chassis braces to remove the differentials more easily. This info can also be found on our website.

RCCA: There's a full array of factory options for the TC4; which should we buy first?

CL: Factory Team titanium turnbuckles and the Factory Team carbon components.

TD: Anti-roll bars, carbon components and the forced-air cooling unit.

RCCA: What's next for Team Associated?

CL: We have many exciting projects planned for 2005 and beyond. I can't tell you about them, but we'll keep you informed. Keep a close eye on our website for hints and secret links.

RATINGS

Instructions	8	The instructions are excellent, but Associated doesn't include a blank setup sheet or baseline setups.
Parts fit & finish	10	Associated's high-quality molded parts make the TC4 easy to assemble.
Turn-in	10	Getting the TC4 to turn in with authority is easy, thanks to its wide range of adjustability.
Corner speed	8	With front and rear diffs, the TC4 loses some corner speed.
On-power steering	9	In the stock setup, it has a slight understeer, but that is easily dialed out.
Acceleration	10	The TC4's drivetrain is efficient and really helps the car to get up and go.

Best buyer››› Anyone who's looking for an extremely adjustable car that's easy to build and can win races.

PERFORMANCE

I first tested the TC4 on an unprepared parking lot and then did extensive testing on the new Ozite carpet track at Hobby Chamber in West Haven, CT. The carpet is placed right on top of a supersmooth asphalt surface that measures 100x50 feet and has 8-foot-wide lanes. This track will host the 2005 ROAR On-Road Carpet Nationals.

With mod power, the TC4 is a rocket, and it handled the power of the insane low-turn mod I installed. I didn't have any excessive torque steer, and there wasn't any wheel hop. The TC4 took off smoothly and tracked straight. To really see how it can get off the line and shoot out of corners, I installed a Reedy MVP stock motor. With this less powerful mill, any excessive drag in the drivetrain would be readily apparent. As expected, the TC4 was slower off the line and in top speed, but it didn't have any trouble putting the power down, and the drivetrain certainly didn't hold the car back. Swapping out the rubber-sealed bearings would undoubtedly allow the drivetrain to spin more freely and improve acceleration, but if you don't race, keep those rubber-sealed bearings in; they last forever. Team Associated includes the lightweight plastic diff outdrives that reduce rotating mass and improve acceleration. When racing, I did break the right front outdrive when I dived at full speed into a corner and caught a wooden track barrier. This type of damage is common in touring car racing, and I was glad I didn't also snap a suspension arm.

With the stock setup, the TC4 has plenty of turn-in to suit my taste, but I could see myself dialing in more as I became more comfortable with the car and the new track. One of the things I like best about the TC4 is that it offers more adjustment options than Associated's previous on-road racers, so dialing in more steering should be a breeze. Out of the box, the TC4 took turns smoothly and handled very predictably. It's very easy to drive and doesn't feel out of control as you dive it from one corner to another. During a day of testing and another of racing, I experimented with variety of spring setups. Finding the perfect setup takes time, but the TC4 reacts well to changes, and the results are readily apparent on the track.

With its full-time 4WD, the TC4 pushes out towards the wall when you hammer around the track at full throttle, but letting off the gas before you enter a corner transfers weight to the front, so the TC4 scoots around even the tightest corners while on power. This is where its new system for adjusting the wheelbase comes in handy. Dialing in more weight transfer is much easier, and the results are much more apparent.

When I reinstalled the ballistic, Reedy, 8-turn mod motor, I crashed the TC4 into a chicane at top speed, and it was sent spinning into another wooden barrier. The crash was spectacular (it would have been better if it wasn't my car!), and the TC4 was damaged. The rear arm mount broke where one of the screws threads through, but that was it. I checked the new, beefier inner hingepins on a glass pane, and they were perfectly straight. Sure, the plastic mount broke, but I was surprised that there wasn't more damage. Team Associated knows that racers hit things and often hit things very hard, so it offers the arm mounts in aluminum; I'll be bolting up a set as soon as I can. I tested this car extensively, and it's as durable as any other touring car I've used (perhaps even more durable).

As a longtime TC3 driver, I saw right away how different the TC4 car is from it. It really is an entirely new car that requires an entirely new setup. My once-golden carpet setup wasn't spot-on in the TC4. It was close, but I still have some experimenting to do. I'm sure everyone who upgrades from a TC3 to a TC4 will discover the same thing. It's important to be patient, even if you're initially slower or less comfortable. The key is that the TC4, with its more adjustable design, has much more potential than its predecessor.

> "the TC4 reacts well to changes, and the results are readily apparent on the track.

second opinion

During our first few packs with the initial stock setup, the TC4 seemed soft, so I opted for stiffer springs in the front and rear. This helped the car in transitions where it felt "lazy" and showed excessive chassis roll. After I had installed the optional springs, it turned faster laps.

It felt surprisingly similar to the Factory Team TC3, but it did seem to corner better, change direction more smoothly and turn faster lap times. By the day's end, I concluded that, according to lap times, the TC4 is faster but only slightly. So, why buy a TC4? If you like the TC3, note that the TC4 is easier to work on and more durable, and I turned faster lap times during my first time out on the track with it. —*Jason Sams*

THE VERDICT

The TC4 is much more than just a revised TC3. It incorporates many new features and still has the best of its predecessor. For many racers, the TC4 offers everything they always wanted their TC3 to have, and for them, maybe it is more of an evolution than a revolution, but for others, the TC4 will be their first no-hassle touring car with a sound design and all the features they need to make the A-main. Be prepared to see a ton of these at the track, and don't be surprised when they start hogging the winners' circle. ■

BY THE RC CAR ACTION TEAM PICS BY PETE HALL

Sure, the Nitro Thunder can be described as a "1/10-scale 4WD nitro buggy," but any image that description conjures up isn't likely to match Tamiya's newest off-road RTR machine. With its molded-tub chassis, underwing exhaust routing and wing-like suspension arms, the Nitro Thunder (or NDF-01, as Tamiya designates the chassis) is unlike any nitro buggy we've ever seen. Strap on the bodywork, and the Nitro Thunder only gets more interesting. The high-shouldered, scoop-festooned shell and flying-nun wing evoke an exciting mix of modern 1/8-scale buggies and Tamiya's classic Avante. It's a technical tour de force and a uniquely Japanese vision of off-road RC. It also looks like a blast to drive—so let's do just that.

Tamiya Nitro Thunder

Fast, futuristic and 4WD: Tamiya Reinvents the RTR Nitro Buggy


NDF-01

KIT FEATURES

CHASSIS. Nitro buggies typically use plate-aluminum chassis, but the Nitro Thunder isn't a typical buggy. The main chassis is an intricately molded, reinforced-plastic semi-tub with a cast-alloy center section that serves double duty as an engine mount and heat sink. The spur-gear/brake assembly is also bolted to the cast plate, so the plastic chassis doesn't have to resist the twisting force of the engine. Molded trays hold the radio gear, and the receiver and its battery are fully enclosed in their own compartment.

DRIVETRAIN. The Nitro Thunder's drivetrain is extra-rugged, with massive 21mm ball bearings that support grease-filled bevel-gear differentials with cast ring and pinion gears. The diffs' internal gears are the only items carried over from Tamiya's existing parts inventory; it's the classic 3-gear setup Tamiya has used on everything from the Manta Ray and M-chassis minis to the Blackfoot series and TA-tourers. Six-spline telescoping plastic driveshafts link the front and rear gearboxes to the wide, plastic spur gear's unusual cast-alloy layshaft. The layshaft is also home to the buggy's fiber brake disc, which is pinched by a pair of steel caliper plates that are squeezed together by a cam-actuated piston. The drive-axle joints are assembled CV-style instead of in the traditional universal-joint arrangement, and identical units reach from the diffs to the wheels.

SUSPENSION AND STEERING. One of the Nitro Thunder's most unusual suspension features is its "impact control system," which prevents crash damage to the front arms by allowing the entire suspension assembly to pivot backward. A stiff spring and O-ring combination keeps the left and right front suspensions in their proper positions under normal driving conditions, but if the car clips a track barrier (or something equally immobile), the arms will flex back to absorb the blow.

Both ends of the car use the same upper and lower wishbones, pivot balls and steering hubs. In the rear, toe links fix the rear hubs, and the front steering links are joined to a single steering bellcrank. Disassembly is required to adjust front and rear toe (since the links are merely threaded rods, not turnbuckles), but camber is easily set by threading the pivot balls in or out of the suspension arms.

INCLUDED ELECTRONICS & ACCESSORIES

TAMIYA EXPEC SP RADIO SYSTEM

The Nitro Thunder's radio gear is as reliable as AM gear gets, but feature-wise, it's strictly basic: on/off switch, a single LED to monitor battery power, a pair of trim knobs and reversing switches. C'mon, Tamiya, this isn't a Gravel Hound—give the Nitro Thunder a radio with adjustable dual-rate. And how about a rubber grip for the wheel?

TAMIYA TS-01 STEERING & THROTTLE SERVOS

These are standard-type units that deliver about 45 oz.-in. of torque. That's enough for good braking and satisfactory steering, but a little more boost from a stronger steering servo would help the Nitro Thunder turn in more aggressively.

250ML FUEL BOTTLE AND DRY-CELL GLOW STARTER

The Nitro Thunder's smallish fuel bottle and plastic-body glow starter are basic, but they work well and save you the trouble of purchasing them separately.

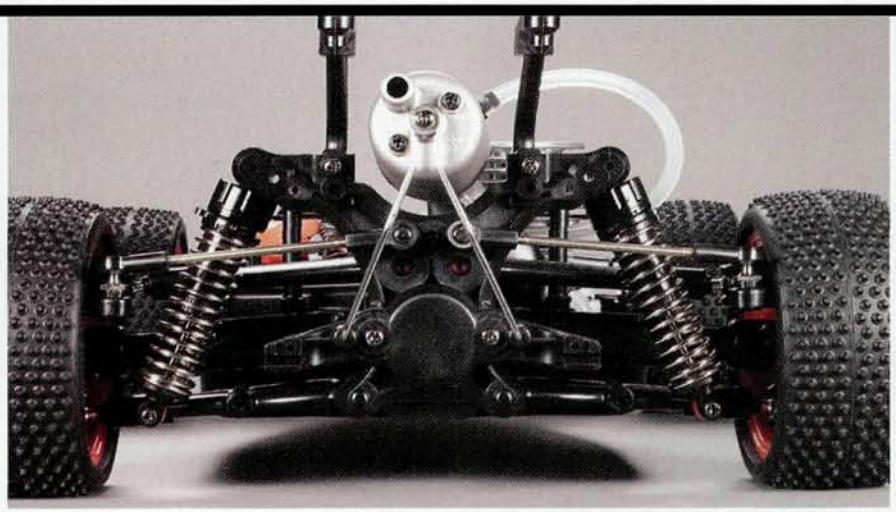
TOOLS

The buggy includes the classic Tamiya box wrench, a cast glow-plug wrench, three L-wrenches to fit all the chassis' hex screws, a stamped 7/8mm spanner and a plastic socket tool to spin the buggy's 17mm axle nuts. A slot in the back of the socket lets you use a screwdriver shank (or the included glow-plug wrench) to apply extra torque.

SPARES

Thank you, Tamiya, for including a pair of extra air filter elements (prelubed, no less), preload spacers, extra rod ends and a few bits of spare hardware to replace easily lost items.

Pivot-ball suspension, streamlined arms and chunky telescoping driveshafts are Nitro Thunder hallmarks. Note the 17mm drive hex.



The Nitro Thunder routes its exhaust straight through the wing mounts, and its overall stance is racy and low. Rear toe is set by threaded rods, and oil-damped plastic-body shocks are standard.

SPECIFICATIONS

MANUFACTURER Tamiya
MODEL NDF-01 Nitro Thunder
SCALE 1/10
PRICE $400
Varies with dealer

DIMENSIONS
Wheelbase 11.8 in. (300mm)
Width 10.5 in. (267mm)

WEIGHT
Total, as tested 90.7 oz. (2,570g)

CHASSIS
Type Semi-tub
Material Fiber-reinforced plastic

DRIVETRAIN
Type Full-time, shaft-driven 4WD
Primary 57T spur gear/13T clutch bell
Clutch 2-shoe
Driveshafts Plastic telescoping with CV-style joint
Differentials Bevel gear with three spider gears
Bearing type Metal-shielded ball bearings

SUSPENSION
Type Upper/lower wishbone with pivot balls
Shocks Plastic body, fluid-damped coil-over

ENGINE AND ACCESSORIES
Engine Tamiya FR15S
Carburetor 2-needle slide
Starter Recoil
Pipe Cast-aluminum with integrated manifold
Fuel tank Unspecified capacity with pump-type primer

ELECTRONICS
Transmitter Tamiya EXPEC 2-channel AM
Servos Tamiya TS-01
Receiver battery Not included

WHEELS
Type One-piece plastic, 3-spoke with 17mm hex

TIRES
Type Low-profile, flat-carcass stud tread

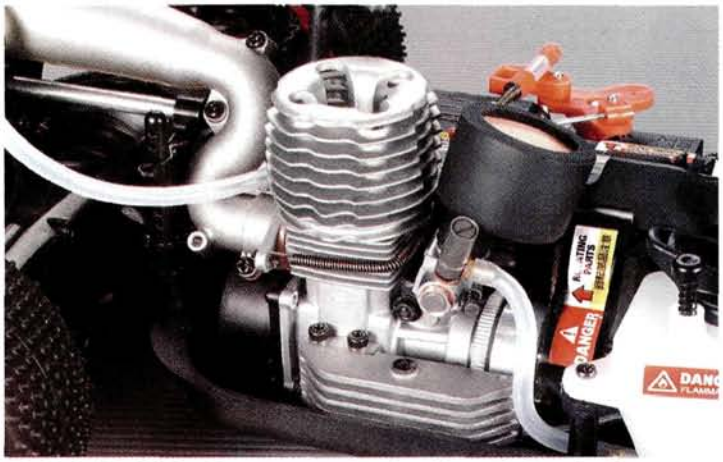
"The Nitro Thunder breaks away from the RTR pack with a fresh, original off-road experience.

A plastic chassis on a nitro car? No problem, thanks to the cast alloy insert plate that serves as engine mount and heat sink. Note the plastic skidplate that protects the spur gear.

Tamiya's CVA plastic-body shocks do the damping, and they're the only other components besides the diffs' internals to have previously served on other Tamiya vehicles. Like the diff gears, the CVA shocks have proven tough, and their double O-ring-and-bladder design gives smooth action.

ENGINE AND ACCESSORIES. Tamiya specs its own FR-15S pull-start engine to motivate the Nitro Thunder. It's got all the features you'd expect: a chrome-plated brass 3-port sleeve, aluminum piston and a machined connecting rod with a bushed big end. A dual-needle slide carb is an unexpected bonus, but the cast heat-sink head is a style buzzkill—a machined-aluminum unit will no doubt be available soon.

The engine is pretty standard stuff, but the exhaust is unique. The pipe and header are integrated into a single S-shape arrangement that vents exhaust out the rear of the buggy from beneath the wing. It looks hot, but it's also *literally* hot and is very easy to grab if you pick up the Nitro Thunder by the wing. Tamiya puts a "Caution: Hot Muffler" decal on the wing for a reason!

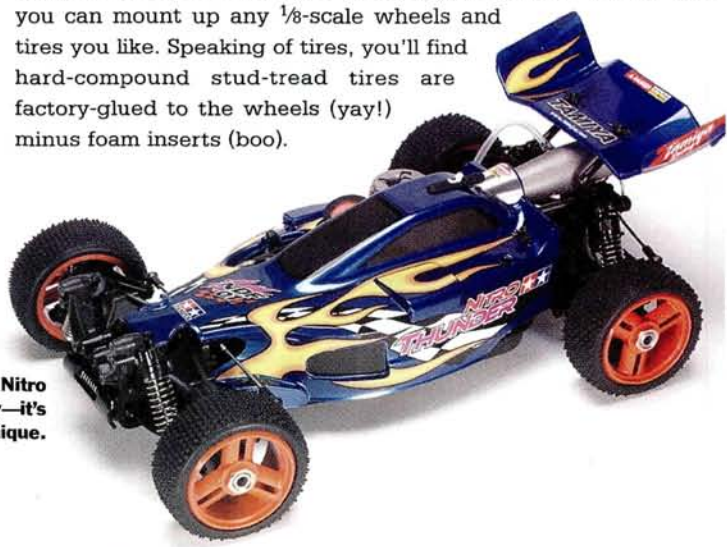


Tamiya's FR-125S pull-start powerplant is well matched to the Nitro Thunder. Check out the supersized finned engine mount!

A compact fuel tank with a plunger-style primer feeds the FR-15S, and the tank is a custom piece that conforms neatly to the chassis to hold the fuel low and close to center. There's no internal filter, however, so be careful not to get any junk in the tank.

BODY, WHEELS AND TIRES. Tamiya does all the body painting, decaling, trimming and mounting for you. The body is trimmed so you can adjust the high-speed needle, grab the pull-starter and refill the fuel tank without removing the body—we like that. Foam seals are included to prevent dirt from sneaking between the body and the sides of the chassis, but they aren't installed for you; just peel off the adhesive backing and stick 'em on.

The rolling stock is unique to the Nitro Thunder. At 70mm in diameter, the 3-spoke wheels are larger than the 2.2-inch (60mm) hoops used by 1/10 buggies but smaller than the 80mm standard used by 1/8-scale buggies. But that doesn't mean you're stuck without wheel options. Since the buggy has 17mm drive hexes, you can mount up any 1/8-scale wheels and tires you like. Speaking of tires, you'll find hard-compound stud-tread tires are factory-glued to the wheels (yay!) minus foam inserts (boo).



No one will mistake the Nitro Thunder for another buggy—it's totally unique.

TUNING TIPS

NO TIRES? NO PROBLEM

Thanks to its 17mm axle hexes, 1/8-scale buggy wheels and tires are a direct fit. They're larger in diameter than the stockers, and that will increase speed at the expense of torque.

LOSE THE PRIMER

Pump-type fuel tank primers are notorious for causing air leaks. If your Nitro Thunder's engine starts to perform erratically (as though it has an air leak), but the carb is well-sealed and the fuel tubing is fine, the primer is your likely culprit. Remove it and then seal the opening in the tank by threading a sealant-coated screw into the hole.

ADD A FUEL FILTER

The Nitro Thunder's fuel tank doesn't have an internal filter, and it's all too easy to get dirt into the tank when refueling a dirty, dusty tank. Install an in-line filter from Great Planes, Dubro, or DuraTrax (among others) to prevent crud from reaching the carb.

LIKES

- Highly original, uniquely Tamiya design.
- Excellent engine—good power and very reliable.
- Big-buggy fun without big-buggy hassles.
- High-speed needle, pull-starter and fuel tank are all accessible with the body on.

DISLIKES

- Transmitter lacks dual-rate steering adjustment.
- Nonstandard wheel and tire size.
- Tires don't have foam inserts.

FIND IT

››› Go to page 250 for manufacturers' contact information

YOU'LL NEED	WE USED
12 AA batteries	Whatever was on sale
One C battery	Ditto
Fuel	Dynamite Blue Thunder

PERFORMANCE

Tamiya includes a detailed break-in and tuning manual with the Nitro Thunder, which we followed to the letter. The FR-15S was easy to tune thanks to its dual-needle carburetor, and the engine ran reliably on Dynamite Blue Thunder 20-percent nitro. Before tearing it up in the dirt, we tested the Nitro Thunder on pavement to get the radar testing squared away. Drag-style launches showed crisp off-throttle response and a steady climb through the rpm range all the way up to full throttle and a best pass of 35.7mph. Top speed will vary with operating conditions, state of tune and fuel, so you may go a little faster or slower, but getting up to the mid-30s should be no problem. That may sound slow in this era of high-velocity RTRs, but remember that the Nitro Thunder is geared for off-road action.

Each full-throttle blast was capped by a stiff stab at the brakes, and the Nitro Thunder proved it can stop as well as it goes, especially when compared with the RTR 1/8-scale buggies and monster trucks we've been driving lately. Like most of those RTRs, the Nitro Thunder uses a standard servo for braking, but its smaller-diameter tires and lighter overall weight are a much better match for standard-servo power. That, and Tamiya spec'd a good brake system for the servo to squeeze. We did notice slight pulsing when braking gently at low speed, but it's nothing to complain about. It didn't affect modulation, and braking control is very precise, all the way to lockup.

So much for pavement testing; it was time to test the Nitro Thunder where Tamiya intended, in the dirt. Pegasus Hobbies in Montclair, CA, was the fun spot of choice, and we were turning laps within minutes of pulling into the parking lot. Finding a fast line wasn't a problem, but staying in the line was a different story, as the Nitro Thunder likes to understeer when entering turns. The hard, foam-insertless tires are probably the biggest contributors to the push since the steering servo wasn't having any trouble cranking the wheels over. Stabbing the brakes to transfer weight to the front wheels helped the Nitro Thunder dig in and enter turns more aggressively. Once in the turn, the buggy drifted predictably and responded well to line changes via steering and throttle inputs.

In the rough, the Nitro Thunder's long arms and relatively light damping let the shocks cycle quickly to keep the chassis composed, but we did notice some chassis scrape through the roughest sections, and it easily high-centered if we tried to roll over obstacles at low speed. We popped on the included preload spacers to increase the ride height a few millimeters, but like any buggy, the Nitro Thunder will always be most at home on smoother surfaces.

There were jumps a-plenty in the Pegasus layout, and the Tamiya buggy flew over them like an electric 4-wheeler. The "Impact Control System" was tested when we cased a few jumps. It was amazing to see the arms flex backwards as if they were going to be yanked off, and then spring back into place like nothing happened. The Nitro Thunder's low-ish gearing made it easy to pop over doubles without a long run-up, and backside landings were textbook buggy. Big launches with flat landings bottomed the chassis, however, so if you plan to give the Nitro Thunder FMX-style airtime, I'd consider upping the shocks' damping.

THE VERDICT

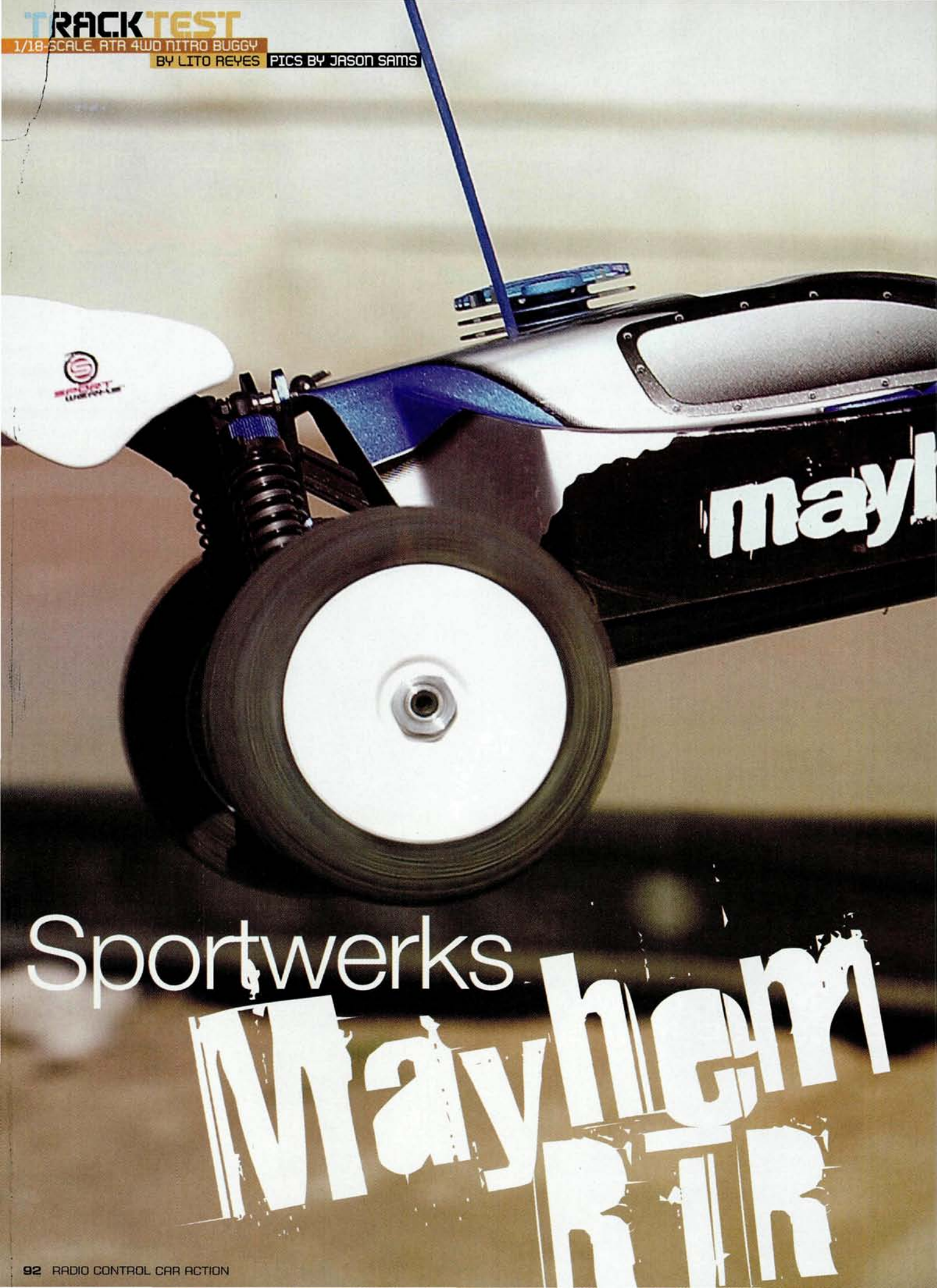
Nice job, Tamiya. The Nitro Thunder is a tough and fun nitro machine that breaks away from the RTR pack with a fresh, original off-road experience. It's a blast in stock form, but we hope to be tempted soon by aftermarket options. Aluminum shocks would be nice, and we can see a MAC-style pipe and spring-coupled manifold in the Nitro Thunder's future, but what we're really hoping for are more tire options. With softer rubber and foam inserts, there's real track potential. Which leads to the inevitable, "They should race these things," and ROAR does in fact have rules in place for nitro-powered, 1/10-scale 4WD buggies. Unfortunately, the Nitro Thunder's wheelbase and wheels land outside of the legal dimensions, but who cares. How about a Nitro Thunder spec class? ■

RATINGS

Instructions	10	Includes a ground-up assembly manual plus a separate starting/tuning/maintenance manual.
Included electronics	8	No frills, but reliable.
Parts fit & finish	9	Perfect molding, but gloss plastic and red details look a little toy-ish.
Acceleration	8.5	The FR-15S makes good power and moves out the Nitro Thunder quickly.
Cornering ability	8	Needs better tires for real racetrack work, but overall cornering is very good.
Bump handling	8.5	Slightly underdamped for really heavy work.
Jumping	8	No drama here; classic 4WD buggy jumping style. Needs more damping for hard landings.
Braking	9	Slight low-speed pulse, but excellent power and "feel."

Best buyer››› Any nitro-power off-road fan.

BY LITO REYES PICS BY JASON SAMS



Sportwerks Mayhem R/R

Super specs, .26 power and JR Racing FM radio gear–in an RTR!

Sportwerks offers its 1/8-scale Mayhem buggy in two trim levels. There's the "almost ready to run" Mayhem Pro (reviewed in the December issue) that omits radio gear and is available with or without a .21 engine and pipe, and there's the Mayhem RTR, which is reviewed here. We know what you're thinking: the Pro must have all the best features, and the RTR is without frills but has a budget radio. Wrong! The Mayhem RTR comes with a massive shaft-start .26 engine, and Sportwerks didn't skimp on the features. A heavy-duty, 3mm, hard-anodized aluminum chassis, pivot-ball suspension, sealed diffs and swanky JR XR3i FM radio gear are all standard! It's a compelling combo of racing stuff (high-end radio gear and fully adjustable, equipped chassis) and play-friendly features (shaft starting and the supersized powerplant). It looks equally ready for race action and backyard blasting.

KIT FEATURES

CHASSIS. The quality of the chassis usually gives a good indication of a car's overall quality and how raceworthy it is. The Mayhem's chassis is a high-quality piece made of 6061 T6 3mm aluminum-alloy stock that's hard-anodized with a scrape-resistant satin-gray finish. All the screw holes have been countersunk, or, as is the case with the engine-mount screw holes, have been routed out to ensure a smooth underside.

Aluminum-alloy, 3mm stock front and rear braces run from the bulkheads to the center of the chassis plate, and molded-plastic mudguards that conform tightly to the body to keep out debris and protect the pipe and radio gear are attached to the chassis' sides. A front bumper protects the front inner hingepin mounts and overlaps the front of the chassis to protect it. All the fasteners are strong, hardened hex screws.

The radio tray is made of aluminum and is connected to the chassis with molded standoffs. The steering servo comes mounted in a laydown position for a lower CG. The radio gear is in an easy-to-access, low-profile hinged box that has enough room to hold a receiver of average size, a dry-cell holder, or a 5-cell hump pack and the associated wiring. The battery switch is installed and has a protective silicone cover, and it's away from the edge of the chassis to prevent you from accidentally switching it off.

DRIVETRAIN. Like the chassis, the drivetrain is packed with race-oriented features. The sealed center differential has a 46-tooth machined-steel spur gear with hardened-steel spider gears, and it comes filled with 5,000WT silicone fluid. The front and rear outdrives are keyed to vented-steel brake discs. The brake linkage is color-coded, and front/rear brake bias can easily be adjusted without tools. An aluminum plate on top of the center diff mount keeps the diff running true and also supports the brake levers. Dogbones transfer power from the center diff to the front and rear sealed bevel-gear diffs. The sealed front diff comes with 5,000WT silicone fluid. The steel front diff yokes mate with rebuildable universal driveshafts. The rear is set up in the same way as the front, but the diff is filled with 1,000WT fluid for less restricted action. All the rotating parts ride on rubber-sealed ball bearings.

ENGINE AND ACCESSORIES. The engine is a Sportwerks .26 rated at 2.75hp.Three carb inserts are included to cope with varied track conditions. Carb inserts restrict the flow of air into the

INCLUDED ELECTRONICS & ACCESSORIES

JR XR3I RADIO SYSTEM
This computer radio has four model memories. It has a well-balanced feel, though the trigger seems to be designed for larger fingers. With its FM signal transmission, it is very reliable, and it has enough features for even the most hardcore racers.

Z590M METAL-GEAR TORQUE RACE SERVO
Most 1/8-scale RTR buggies come with a standard steering servo. The Z590M metal-gear servo offers 85 oz.-in. of torque and a 0.15 second/60-degree transit speed. It can handle the weight of an 1/8-scale buggy better than any stock servo. Metal gears make it tough enough to survive abuse.

Z270 STANDARD RACE SERVO
This standard servo is used for throttle and braking. Its 0.19 second/60-degree speed rating and 49 oz.-in. of torque put it right on par with other standard servos, and it works just fine.

SPORTWERKS SHAFT STARTER The starter wand houses a standard stick pack (not included), and its thick strap isn't just for convenience; the starter puts out enough torque to twist it out of your grasp.

TOOLS
A variety of simple hex wrenches, a turnbuckle wrench and servo-horn inserts (for non-JR servos) and a four-way wrench for glow plugs, nuts and wheel nuts all come with the kit.

Left: the included Sportwerks .26 is a potent powerhouse that's factory-rated at 2.75hp. Three carb inserts are included so you can tune its powerband to match your track.

Right: the Sportwerks Mayhem has a 125cc fuel tank with internal baffles that help to minimize fuel foaming; a drainage groove is molded in the top to funnel away spilt fuel when you refuel.

SPECIFICATIONS

MANUFACTURER Sportwerks
MODEL Mayhem RTR
DISTRIBUTED BY Horizon Hobby Inc.
SCALE 1/8
PRICE $550
Varies with dealer

DIMENSIONS
Wheelbase 12.8 to 13 in. (325 to 330mm)
Width 12.2 in. (310mm)

WEIGHT
Total, as tested 122 oz. (3,447g)

CHASSIS
Type Machined plate with aluminum braces
Material 3mm 6061 T6 aluminum

DRIVETRAIN
Type Shaft-driven 4WD
Primary 13-tooth clutch bell/46-tooth spur gear
Transmission ratio 3.31:1
Final drive ratio 11.7:1
Drive shafts Universal
Differentials Sealed bevel with hardened-steel gears
Bearing type Rubber-sealed ball bearings

SUSPENSION
Type (F/R) A-arm pivot ball/lower H-arm w/adjustable upper camber link
Shocks Threaded, hard-anodized aluminum with 3.5mm shafts and bladder seal

ENGINE AND ACCESSORIES
Engine Sportwerks .26; slide carb; rear exhaust; external starter
Clutch 3-shoe
Pipe/manifold Once-piece Sportwerks 053 inline exhaust
Fuel tank 125cc primerless

ELECTRONICS
Transmitter/receiver JR XR3i
Servo(s) JR Z590M, Z270

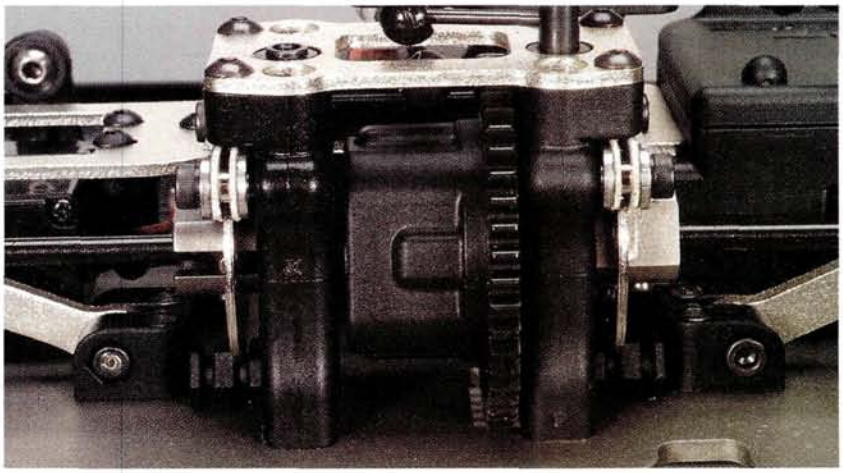
WHEELS
Type Sportwerks one-piece white dish

TIRES
Type Sportwerks Havoc mini-pin

FACTORY OPTIONS

- Blue, vented flywheel—item no. SWK9190
- Pro shock towers (F/R)—SWK9142/SWK9162
- Threaded shock-adjustment collars—SWL3012

Left: the pivot-ball steering system uses clever screw-on retainers instead of threaded inserts. Caster can be set by using shims to reposition the upper arms.



The center diff comes with a sturdy, 46-tooth, machined-steel spur gear. The dual-disc brakes provide plenty of stopping power.

carb to alter how quickly the engine revs. A 6.5mm insert is supplied for slippery tracks on which wheelspin should be minimized. The installed 7.5mm insert is for good midrange power on medium-traction surfaces, and the 9mm insert is for high-traction tracks on which you can really put the power down.

The engine is finished in black and has a large, blue-anodized 10-fin heat-sink head. Instead of a pull-starter, the backplate has a hex insert to accommodate a hand-held starter unit.

An aluminum flywheel with a 3-shoe clutch is attached to the integrated pilot shaft. The steel clutch bell is fitted with a 13-tooth pinion. Additional clutch bells in several sizes are available.

Exhaust duties are handled by a one-piece Sportwerks tuned pipe/header unit. Made of aluminum and sporting silicone gaskets and steel springs, this is a race-quality pipe and not just a muffler.

The 125cc fuel tank has internal baffles to minimize fuel sloshing and give consistent fuel delivery. A fuel drainage groove is molded in the top of the tank, and it's connected to a short piece of tubing that safely drains spilt fuel out though a hole in the chassis plate and under the car. This, combined with the screw-on splash-guard, should effectively keep excess fuel away from fuel-sensitive parts such as the brake pads. A high-volume blue-anodized fuel filter comes in the accessory bag, but it isn't installed.

SUSPENSION AND STEERING. The Mayhem uses a mix of pivot-ball and hingepin suspension designs. Up front, the plastic steering blocks pivot on large, 14.6mm pivot balls that are hard-anodized for durability; 1mm to 1.5mm shims inserted between the pivot-ball shanks and the upper and lower arms make quick camber changes possible without setup tools. The heavy-duty upper and lower arms ride on large, 4mm hingepins on their inner mounts. Snap-on shims in front of and behind the upper arms make it easy to adjust front caster. In the front and rear, the lower arms have machined-aluminum pivot plates that are guaranteed not to break. In the rear, the lower arms pivot on 4mm hingepins, but they have hingepin-mounted upright hubs to carry the axles. The camber links are made of 5mm-thick tie rods. There's a lot of adjustability here: on the uprights, there are two holes and four inner holes plus two lower hingepin holes to allow roll-center adjustment, and well shims allow the wheelbase to be made 5mm longer or shorter. Swaybars come installed on the front and the rear to minimize body roll in the sweepers.

The shocks have threaded, hard-anodized bodies and 3.5mm shafts and are filled with 30WT fluid. Threaded shock collars are not included. Instead, you get an array of clip-on shock-preload spacers. The shock towers are made of 3mm 7075-T6 aluminum stock. The front tower has four upper shock-mounting holes to go with the two lower holes on the front lower arms; the rear tower has six upper holes and three lower holes on the rear arms. This should be more than enough for most people to get dialed on any track.

The steering is a typical bushed-bellcrank design with a built-in adjustable servo-saver. The drag link and upper plate are made of machined aluminum. The steering turnbuckles are 4mm thick and easy to adjust.

BODY, WHEELS AND TIRES. The Mayhem body looks pretty good with its four-color paint scheme. It comes trimmed and mounted and with the window decals in place. Soft, mini-pin tires with foam inserts are mounted on white dish wheels.

TUNING TIPS

THREAD-LOCK

Almost all of the screws had been secured with thread-lock, but a few hadn't been given enough of the stuff or had been skipped entirely. Take the time to check every metal-to-metal fastener (except the ones with lock-nuts), and you'll avoid headaches later on—like having to find the drag-link bushing that you lost in turn three.

ENGINE PROTECTION

The manual doesn't have a picture of how you should install the fuel filter. Here's what you do: at the carb end, cut about 4 inches off the fuel line that runs from the tank to the carb. Install the filter so that the mesh side (the side with the O-ring) is toward the carb.

ENGINE-TUNING ACCESS

The fuel-tank access hole in the body isn't quite big enough to allow you to reach the top carb needle. Either use a rotary tool to cut a new hole or enlarge the existing one slightly (this will look cleaner).

Clutch Fix

When I broke in the Mayhem's engine, I had a problem with the 3-shoe clutch. By the end of the fifth tankful, clutch performance had deteriorated dramatically. On tearing it down, I found that the shoes were worn down to the springs. Apparently, early production kits came with the wrong shoes. Horizon Hobby will correct this if you have an early version; call the support line. If you aren't sure whether your car is affected, call Horizon and give the techs your car's serial number; they'll be happy to help you.

THE COMPETITION

VEHICLE >> REVIEWED
GS Racing Storm RTR Plus >> 1/05
OFNA Hyper 7 PCR RTR >> 3/04
OFNA Jammin' X1 RTR >> 1/05
XTM X-Terminator >> 11/03 (*RC Nitro*)

Partial list

LIKES

- High-quality parts.
- Very good out-of-box handling.
- Strong engine.
- Excellent RTR radio.

DISLIKES

- Shock bodies are threaded, but threaded collars are an option.
- No center universals.
- Some screws weren't thread-locked.

YOU'LL NEED	WE USED
Stick pack	Orion Rocket 3300 Pack
TX and RX cells	12 Duracell AA dry cells
Glow igniter	Dynamite glow igniter
Fuel	White Lightning Pro Race 20% nitro

FIND IT
>>> Go to page 250 for manufacturers' contact information.

RADAR TESTING

Distance (in feet) traveled in:	0-132 ft. time	Speed at 132 ft.
1 SEC. 15.3	3.3 SEC.	41.2 MPH
2 SEC. 57.9		
3 SEC. 113.8	Time to top speed	Top speed
4 SEC. 174.9	8.1 SEC.	48.6 MPH
5 SEC. 240.1		

PERFORMANCE

After breaking in the engine, I headed to Hot Rod Hobbies in Saugus, CA. This medium-length off-road track has a hard-packed surface and plenty of challenging features. It was easy to start the .26 powerplant using the included shaft-starter, which had no problem cranking the big engine thanks to its torque-amplifying reduction gears. It sure beats yanking on a pull-starter.

I thought the Mayhem's damping would be a little too light for the track, and I had heavier fluid ready, but I needn't have bothered. The stock 30WT worked just fine, especially going over the rutted washboard sections. Thicker fluid would have reduced the shocks' responsiveness. The damping was right, but I thought that the Mayhem could hold the track a little better. I set the ride height so that the universals were level and added a degree of negative camber to the front and rear to keep more tread on the ground as the chassis leaned in the turns. It helped; the Mayhem felt very well planted on the course's many tight turns.

I Initially had doubts about the JR Z590M steering servo. It's definitely a step up from the 40 oz.-in. "standard" servos most RTRs include, but its 85 oz.-in. rating is still less than the 100 oz.-in. recommended for 1/8-scale buggies. This wasn't a problem; the servo didn't have any trouble swinging the wheels. Steering response was sharp, but not aggressive; the stock setup tended to push in the turns. That isn't the fastest way around a track for an experienced driver, but it's much faster than looping out in each turn as a first-time buggy driver would likely do with more racer-oriented settings. Sportwerks gets points for building pro features into an RTR while keeping its setup beginner friendly.

The biggest challenge at Hot Rod was timing the doubles and triples to land the buggy properly and maximize acceleration. Even with the 7.5mm carb insert, the Mayhem's big .26 engine still delivered enough rip to easily to overshoot the doubles if I wasn't careful, and clearing triples was easy. The buggy responded predictably to midair throttle and brake inputs.

A well-sorted suspension and plenty of power on demand are just two of the items among the "big three" trademarks of a track-ready car. The third is braking power, and the Mayhem delivers here, too. Initially, the brakes felt grabby, but when the pads had broken in and I had re-adjusted them, they performed consistently well. I also increased front brake bias more to compensate for weight shift.

I tried a couple of other sets of tires with the Mayhem, but I always returned to the stock Havoc tires because they worked best on the track. I ran it for a few hours, and the Mayhem suffered only a few scratches on its wing and chassis' underside.

THE VERDICT

The Sportwerks Mayhem RTR is billed as a race-ready RTR, and it is. It's durable, it has features that will give most other RTRs an inferiority complex, and it's backed by very good factory support. At about $550, it's also very good value, especially when you consider that it comes with an excellent FM computer radio, a .26 engine, an aluminum pipe and a shaft starter. Its out-of-the-box performance is very forgiving—neutral handling with some push—but you can tune the suspension to be as aggressive as you like by using the many shock-mounting positions, roll-center settings and camber, caster and wheelbase adjustments. And don't forget the many carb inserts for engine tuning. It's fair to say that the Mayhem is a racer in RTR clothing. ■

RATINGS

Instructions	9	Good setup info, especially for the brake linkages. The exploded diagrams are clear.
Included electronics	10	JR Racing FM radio gear far outclasses typical, no-frills RTR radio systems.
Parts fit & finish	8.5	Excellent parts quality, but the assemblers missed the thread-lock on a few screws.
Turn-in	8	Starting setup is forgiving for drivers new to big nitro buggies, but racers will want more steering.
Corner speed	9	High-speed cornering, aided by the front and rear swaybars, was very good.
On-power steering	8.5	There was noticeable push, but using a different rear diff fluid cured this.
Braking	7	Brake pads glazed quickly and had to be readjusted, but performed very well once broken in.
Bump handling	9	The fairly soft shocks soaked up bumps well.
Jumping	9.5	Very easy to adjust attitude in mid-flight; some chassis slap, but that's expected of a buggy.

Best buyer››› All nitro-buggy fans.

BY GEORGE M. GONZALEZ PICS BY JASON SAMS

Team Associated RC

Within just a few days of the Associated RC18T's debut as a "Hot News" item at rccaraction.com, our website's bulletin board had more than 10,000 posts with questions and comments about the new truck. That tells me you are as excited about the A-Team's new micro-machine as I am! The RC18T is now available, and judging by its long list of features, it looks like the frontrunner in the race to be best-of-the-best in the 1/18-scale off-road category.

The RC18T arrives fully assembled and ready to go, and it includes just about everything you need, including a 6-cell, a NiMH battery pack and a charger. Install the batteries in the transmitter, charge the battery and you're racing.

Little Truck ...

Big Performance

18T

KIT FEATURES

CHASSIS. The RC18T's molded semi-tub chassis has a baby-bottom-smooth underside with very few screw holes; in fact, the only protrusion is the removable cover that protects the spur gear. An opening underneath the motor provides cooling and allows the installation of a 300 motor (for the speed freaks. Yup; I'm one of them). Slotted and recessed motor-mounting screw holes ensure easy gear-mesh adjustment and protect the small, button-head screws from the elements. The front of the chassis is kicked up to improve bump handling, and a front bumper and skidplate combo provides ample crash protection.

The narrow, one-piece upper deck has molded-in gearbox covers and runs from the front to the rear of the chassis to provide a rigid backbone. The included 6-cell flat-pack dominates the chassis' left side and is held by a molded battery strap. Remove two body clips and the pack is in your hand. The motor, ESC and servo are mounted on the right side of the chassis to balance the weight of the battery pack, and the receiver is centered on the upper deck. The chassis' "1/10 scale-style" design gives the RC18T the lowest CG in its class.

DRIVETRAIN. The shaft-drive 4WD system spins smoothly on shielded ball bearings. A 55-tooth spur gear is attached to hex-shaped flats on the aluminum propeller shaft, and bevel gears attached to both ends of the propeller shaft mate with the front and rear diff gears to provide full-time 4WD. The completely adjustable front and rear ball diffs are like miniature TC4 diffs; they have hard-steel diff balls, locked diff rings and a thrust-bearing assembly—just like 1/10-scale ball diffs.

The included 280 motor is bolted to a universal aluminum mount that has four slots that accommodate a variety of micro electric powerplants, including big-blocks and brushless motors. A 14-tooth, steel pinion gear is attached to the motor shaft with a setscrew, and the stock gearing yields a good balance of acceleration and top speed. Front and rear plastic dogbones provide the final drive, and the front and rear stub axles spin smoothly on bearings.

SUSPENSION AND STEERING. The RC18T has lower suspension arms with fixed upper links. The suspension arms can be swapped from left to right and front to rear. Fixed-length, extra-rugged, molded camber links provide the correct wheel alignment. You can adjust roll center by installing shims underneath the inboard vertical ball studs.

The inboard suspension-arm hingepins are captured by the front and rear arm mounts, and the outboard hingepins are

INCLUDED ELECTRONICS & ACCESSORIES

TEAM ASSOCIATED XP2 TRANSMITTER & TR203A MICRO-RECEIVER

The XP2 27MHz AM radio is a full-function unit with steering and throttle trims, steering dual rate and throttle high and low ATV adjustments. The radio also has a 3-light LED power meter, an angled steering wheel that cuts down on wrist fatigue and a charging jack, in case you want to use rechargeable batteries. The TR203A receiver is ultra-compact—perfect for a micro-machine.

TEAM ASSOCIATED XPS 8023AE MICRO ESC

The XPS ESC uses the latest SMD-MOS FETs for smooth acceleration and long run times. According to Associated, the XPS ESC can handle 19-turn 540 motors, so it can easily take on the most powerful micro-motors. The forward, brake and reverse ESC has a forward-only race mode and "Real Time" braking, and it uses standard micro-connectors. Its compact size and power capabilities make this ESC a keeper.

XP1016 MICROSERVO

The XP1016 might be tiny, but it has plenty of torque and speed to allow highly precise driving. A built-in servo-saver protects the servo.

RC18T SPORT BATTERY PACK & CHARGER

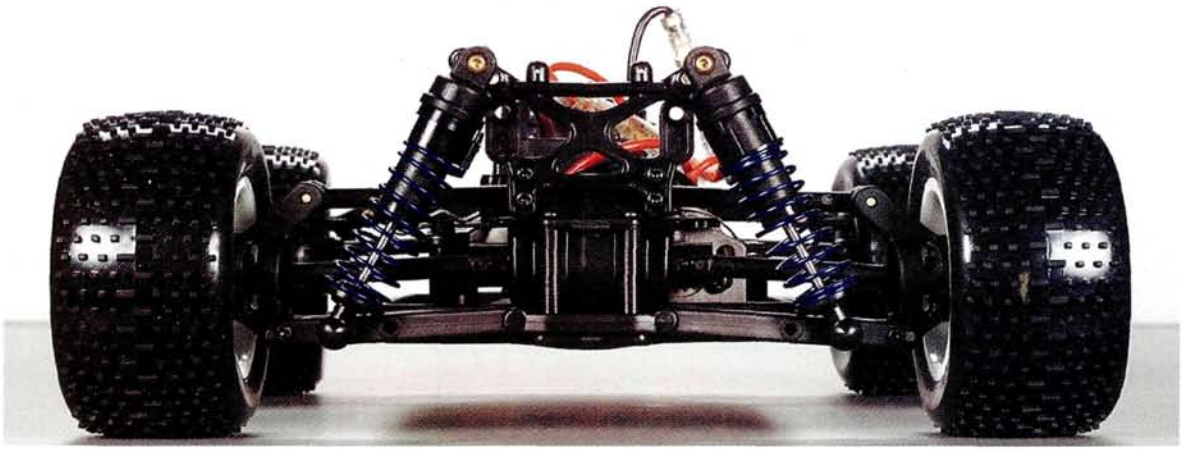
The RC18T includes a high-capacity 1100mAh NiMH 6-cell battery pack (for extra-long run times) and 7.2 volts of power. This is a huge bonus and an expensive option on other RC micro-trucks. The included AC wall charger is not a quick-charger, but it will safely charge the included battery pack while you sleep at night.

RC18T MICRO-MOTOR

Team Associated didn't skimp on the motor. Its performance rivals those of many modified micro-motors that I've tested!

TOOLS

The RC18T comes with a 4-way box wrench, a 1.5mm hex wrench and a plastic ESC adjustment tool—basically, everything you need to wrench on the RC18T except a no. 1 screwdriver.



The RC18T has a low, stadium-truck stance for great handling. The mini-pin tires are factory-glued, and the oil shocks give a smooth ride.

SPECIFICATIONS

MANUFACTURER Team Associated
MODEL RC18T

SCALE 1/18
PRICE $179
Varies with dealer

DIMENSIONS
Wheelbase 6.06 in. (154mm)
Width 7.16 in. (182mm)

WEIGHT
Total, as tested 9.52 oz. (553g)

CHASSIS
Type Semi-tub with one-piece upper support
Material Molded-composite

DRIVETRAIN
Type Shaft-drive 4WD
Primary 14T pinion/55T spur
Transmission ratio 2.5:1
Final drive ratio 9.82:1
Driveshafts Plastic dogbones
Differentials Ball
Bearing type Metal-shielded ball bearings

SUSPENSION (F/R)
Type Lower suspension arms with fixed upper camber links
Shocks Plastic-body, oil-filled

WHEELS
Type 1-piece plastic dish

TIRES
Type RC18T mini-pin

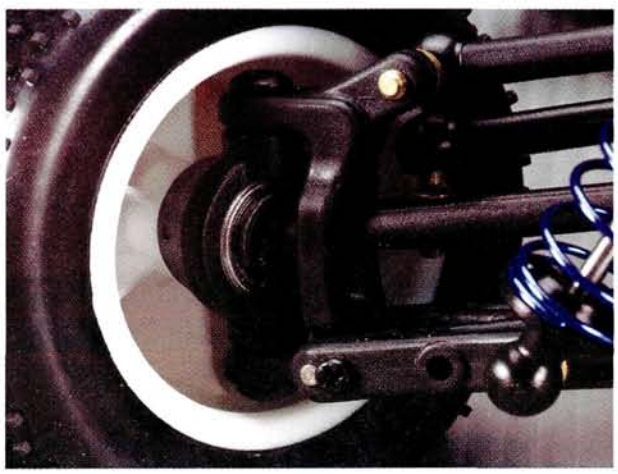
ELECTRONICS
Transmitter Associated XP2
Receiver Associated TR203A
Servo Associated XP1016
Speed control Associated XPS 8023AE

FACTORY OPTIONS

- Aluminum
  - motor mount—part no. 21093
  - threaded-body shocks (F/R)—21216/21217
  - dogbones—21031
  - shock towers (F/R)—21221/21222
  - suspension arms—21220
- Titanium turnbuckles—21055
- Graphite battery brace—21138
- Carbide diff balls—21116

Below: the front C-hubs are well inside the wheel to enhance handling, and the plastic dogbones operate smoothly. This shot also reveals the steering hubs' ball bearings.

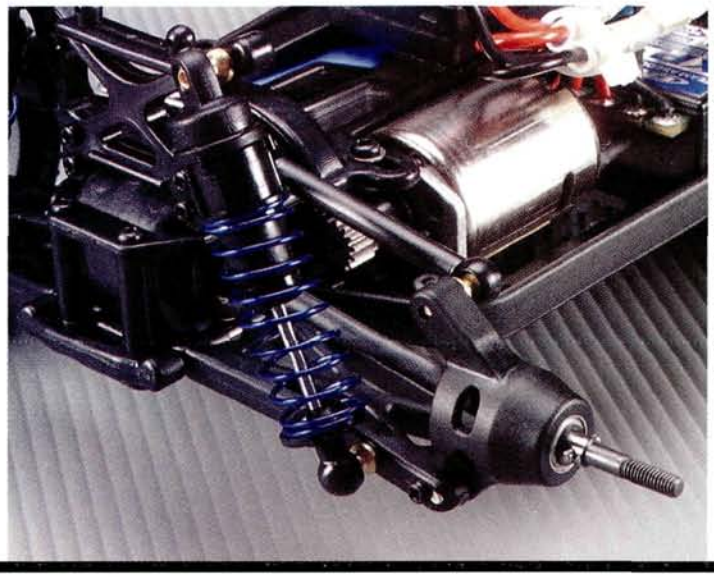
The RC18T includes Team Associated XPS micro-electronics. The forward, brake and reverse ESC can handle the hottest micro-motors and has reverse lockout for racing.



secured by small screws that are threaded into the suspension arms—no more tiny E-clips! This is a great feature because the E-clips on micro-machines are almost too tiny to work with.

Instead of the friction-shock pogo-sticks used in most minis, the RC18T uses oil-filled shocks. The lightweight, plastic-body shocks feature double O-ring seals, volume-compensation bladders, interchangeable pistons, clip-on preload spacers and shiny blue shock springs. The shocks operate very smoothly and, more important, they don't leak. The front and rear shock towers are extra-sturdy and offer three upper shock-mounting options for tuning. The shock towers have tiny molded-in body posts, and the rear tower has mounting holes that appear to be for for extra-long rear body posts (to accommodate SUV-type bodies, no doubt).

BODY, WHEELS AND TIRES. With its trick-looking stadium body, the RC18T looks like a miniature T4. The body is painted and detailed with sharp-looking graphics and looks great, but I'm surprised that it doesn't have a wing—that would be the perfect finishing touch. The mini-pin tires have foam inserts and are factory-glued. The tires hook up on a variety of surfaces, and they're molded out of a long-lasting compound.



The rear hub carriers are equipped with bearings, as is the rest of the drivetrain. Fixed upper camber links ensure the correct wheel alignment. Want more adjustability? Associated offers titanium turnbuckles as an option.

The aluminum motor mount will accommodate most micro-motors and does an effective job of dissipating motor heat. Check out the steel pinion gear—tough stuff.

TUNING HPS

ROLL CENTER
You can adjust the front and rear roll center by installing shims under the vertical ball studs.

MORE STEERING
For a little more steering, add 0.5mm shims under the rear ball studs.

LESS BUMP-STEER
You can eliminate bump steer by placing a 2mm shim or washer under the steering-knuckle ball studs.

Faster charging

TRITON ELECTRIFLY PEAK-CHARGER

The RC18T comes with an overnight charger, but I wanted to play right away. I used my trusty Triton Electrify to zap the battery pack. This DC-powered computerized peak-charger and cycler can charge just about any kind of battery pack, including Lithium-ion and lead-acid packs. It has a 0.05 to 5A adjustable charge rate and charges 1 to 24 cells. It also has an adjustable discharge-cutoff voltage and can cycle packs up to 10 times. The 2-line, 32-character LCD shows capacity, voltage and charge time, and it's easy to program via its thumbwheel navigator.

LIKES

- Lots of features.
- Oil -filled shocks, ball diffs, full bearings, 4WD.
- High-quality micro-electronics.
- Excellent handling.
- Great-looking body.

DISLIKES

- Body doesn't include a wing.
- Included wall charger takes overnight to charge the battery pack.

THE COMPETITION

RC18T

VEHICLE >> REVIEWED
Team Losi **Mini-T** >> 02/04
DuraTrax **Mini Quake** >> 02/05
Trinity **Itsy Bitsy Spider** >> 02/05
XRAY **M18-T**
Venom **Mini Giant**

FIND IT
>> Go to page 250 for manufacturers' contact information

PERFORMANCE

After peaking the battery pack, I headed to my front yard for preliminary tests. I was immediately impressed by the RC18T's acceleration and top speed. This little truck rips! Associated obviously geared it just right because it has the perfect balance of acceleration and speed. It's just as fast as many of the modified micro-machines I've tested!

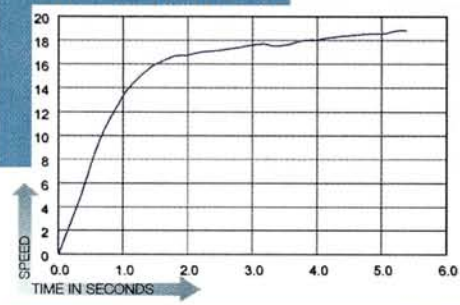
After tearing up the tarmac for a while, I made a dash for dirt and gravel. Thanks to its 4WD traction and neutral steering, which makes it incredibly easy to drive, the RC18T is right at home in the loose stuff. It has a slight push under power, but at slower speeds, it turns on a dime. I had a blast running it in loose gravel and sending roost out from all four tires, and I could have drifted in the corners all day because the truck does it so well. I did manage to jam up the drivetrain a couple of times when a small stone got caught between the pinion and spur gears. Running the truck in reverse quickly dislodges any debris from the drivetrain, though.

After nearly 15 minutes of run time, the battery pack dumped. I decided it was time to see how the RC18T would handle on an off-road track. I met associate editor and partner in crime Jason Sams at Hot Rod Hobbies in Saugus, CA, for the photo shoot. After getting the shots out of the way, it was time for hot laps. The little RC18T seemed to get lost on the big off-road track, but it had enough acceleration to clear many of the jumps. I had to "single" the double and triple jumps because they were just too widely spaced for the truck to leap them in one swoop.

I was really impressed by the RC18T's suspension; the small dips and other surface imperfections hardly fazed it; in fact, it felt more like a 1/10-scale truck than a micro truck.

I also ran the truck at Team Associated's 8x18-foot off-road track. That may sound a little tight, but the track easily accommodates three or four micro trucks racing together. I can't remember the last time I had so much fun racing an RC truck! It took only about 6 seconds to complete a lap, and this meant fast-paced action. The Associated guys' RC18Ts were noticeably faster than mine, but I discovered that they had geared down with 12-tooth pinions (cheaters). I liked the track so much, I'm building one in my own backyard so that I'll be able to race my buds. Instead of driving to the track in the morning, I'll be able to stroll out in my slippers!

RADAR TESTING



Distance (in feet) traveled in:	0-132 ft. time	Speed at 132 ft.
1 SEC. 11.0	5.7 SEC.	18.9 MPH
2 SEC. 34.1		
3 SEC. 59.4	Time to top speed	Top speed
4 SEC. 85.5	5.3 SEC.	18.9 MPH
5 SEC. 112.5		

THE VERDICT

I love this truck! Team Associated has knocked the ball out of the park with this one. The RC18T looks good, handles very well and is loaded with standard features that are expensive options (or not available) on other micro-trucks. The front and rear ball diffs, oil-filled shocks, 6-cell battery pack and charger are bonuses, but it's the smoothly spinning shaft-drive 4WD system that puts this truck in a class of its own. ■

RATINGS

Instructions	10	Excellent "Quick Start Guide" and complete step-by-step assembly manual.
Included electronics	10	Featured-filled radio, smooth micro-ESC, powerful motor and high-capacity batteries.
Parts fit & finish	10	My RC18T was built perfectly, and the quality of the parts is excellent.
Turn-in	10	The RC18T's very tight turning radius allows it to dive into and out of the corners at low speeds.
Corner speed	10	The RC18T carries plenty of speed in the corners, thanks to its 4WD traction.
On-power steering	9	Slight on-power push.
Braking	10	Smooth braking, and the 3-second reverse delay protects the drivetrain.
Bump handling	9	For its size, the RC18T handles the rough stuff well. Oil-filled shocks greatly improve bump handling.
Jumping	9	Loves to jump, but it has a tendency to nose-dive. Staying on the throttle while it jumps corrects this.

Best buyer››› Anyone; beginners and experts alike can enjoy the RC18T.

2004 NITRO Touring Car Worlds

KYOSHO & SIRIO GET WET 'N' WILD

WINNING ANY INTERNATIONAL FEDERATION OF MODEL AUTO RACING (IFMAR) WORLD CHAMPIONSHIP IS A BIG DEAL, but when the first ever Worlds for a new racing class is on the line, it's an especially big deal. Which manufacturer wouldn't want to get into the record books as being the first champion? The 2004 IFMAR 1/10-scale 200mm Nitro Touring Car World Championship was officially IFMAR's first event specifically for gas sedans, and all the big names wanted to take home the cup (a trip to beautiful Jundiai, Brazil, for the race was an incentive, too). The weather didn't always cooperate, but not even pouring rain could slow down the world's fastest gas guys—though only one could take home the title.

Story & photos by Mike Myers

Team Mugen USA at the Worlds with Chad Bradley, Kris Moore, Robbie Collins, Mike Swauger and "that guy ...." Swauger was very hot in the U.S. recently with his MTX-3, but he couldn't put it together in time to make the final.

IN BRAZIL.

Team Associated came to Brazil with a strong team and a strong car, but lady luck wasn't very good to them, as gremlins and handling ills kept them out of the final. Pavidis, however, won the World Cup during the 1/8-scale On-Road Worlds in Ohio in 2003, and that set the stage for this event.

Newly crowned IFMAR Worlds champ Adrien Bertin tosses in a bicep shot. Takaaki Shimo (left) and Chris Tosolini (right) completed the Kyosho/Sirio sweep of the podium.

PRACTICE

Three days were allotted for open practice, and two days of "controlled" practice allowed drivers to be sorted into scheduled practice heats. Ten cars were allowed to practice on the track at a time for 10 minutes. Track announcer (and club president) Fabio Cirello did a great job of informing the racers as to what was going on.

The event began with some unpleasant surprises. After heavy rains, the ground was soaked. Worse yet, the wind and rain had severely damaged the tent where everyone was pitting, and the officials, concerned that it might collapse, told racers to find other places to pit. Some headed for a covered shelter with a concrete floor in the radio-control airplane area; others set up next to containers that were spread around the pit area. Eventually, with a little help from the sun, the track dried out, and IFMAR officials decided to allow more practice rounds until the opening ceremonies.

QUALIFYING

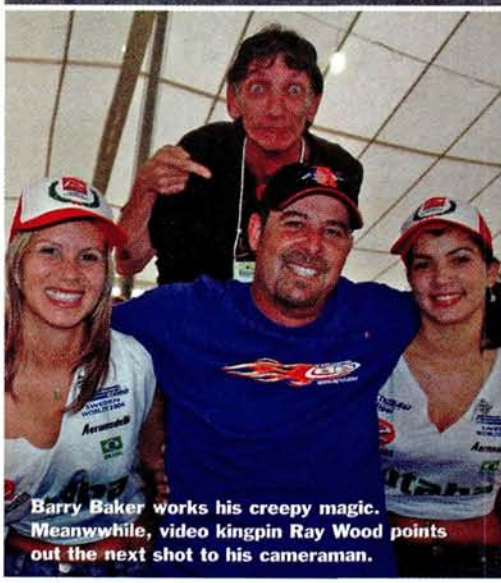
Qualifying started on time and ran smoothly until a power failure during heat 8 affected the PA system but not the scoring computer.

The racing was excellent. The guys at the top are all very talented, and though they sometimes got to within inches of one another, there were very few collisions. Some of the top racers looked great, yet others who are typically found at the top were struggling. Serpent's Michael Salven was very fast but was fighting a traction-rolling problem. Barry Baker's Nitro TC3 looked fast at times, but he, too, had difficulties. Josh Cyrul's Sirio-powered Kyosho V-One RRR was ballistic in its first heat until it ran out of fuel just inches before the finish line; in his second heat, Josh broke the car, and in the third heat he had a bad pit stop. To me, Josh's car looked the fastest on the track, but that was partly because of his driving style. Kyosho's Adrien Bertin, Francesco Tironi and Takaaki Shimo drove flawlessly, and the Sirio-powered Kyosho cars certainly seemed to have an advantage.

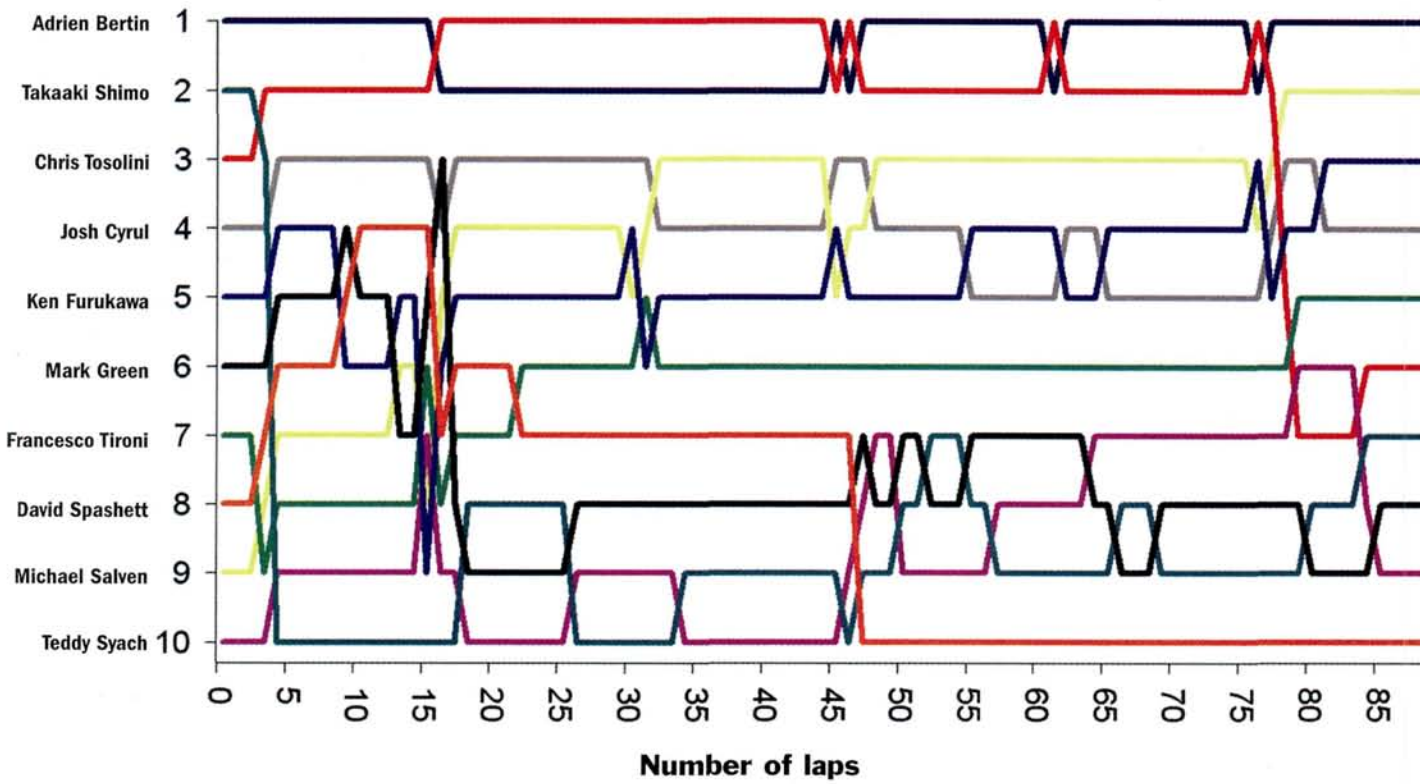
Qualifying standings at the end of Round 4*

1	Adrien Bertin	Kyosho V-One-RRR
2	Francesco Tironi	Kyosho V-One-RRR
3	Josh Cyrul	Kyosho V-One-RRR
4	Takaaki Shimo	Kyosho V-One-RRR
5	David Spashett	Kyosho V-One-RRR
6	Chris Tosolini	Kyosho V-One-RRR
7	Massimo Fantini	Serpent 710
8	Takua Ito	Kyosho FW-05R
9	Ken Furukawa	Kyosho V-One-RRR
10	Mark Pavidis	Associated Nitro TC3

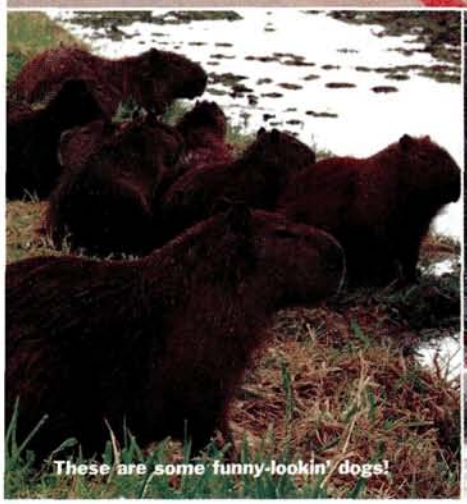
*Round 5 was canceled because of rain.



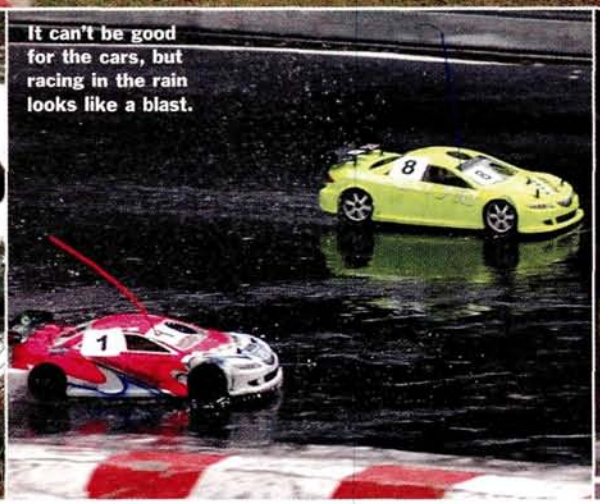
Barry Baker works his creepy magic. Meanwwhile, video kingpin Ray Wood points out the next shot to his cameraman.



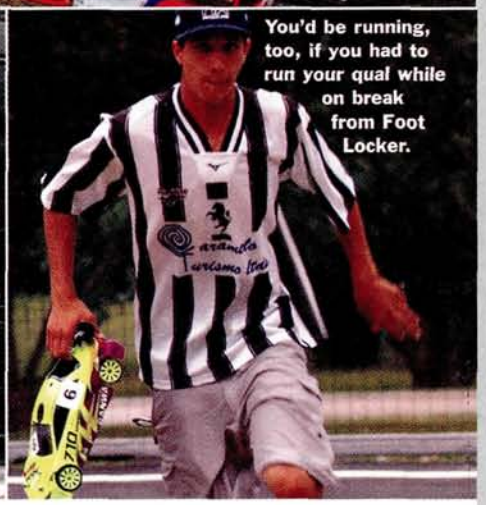
IFMAR is big on official opening ceremonies—as well it should be; this is serious stuff.



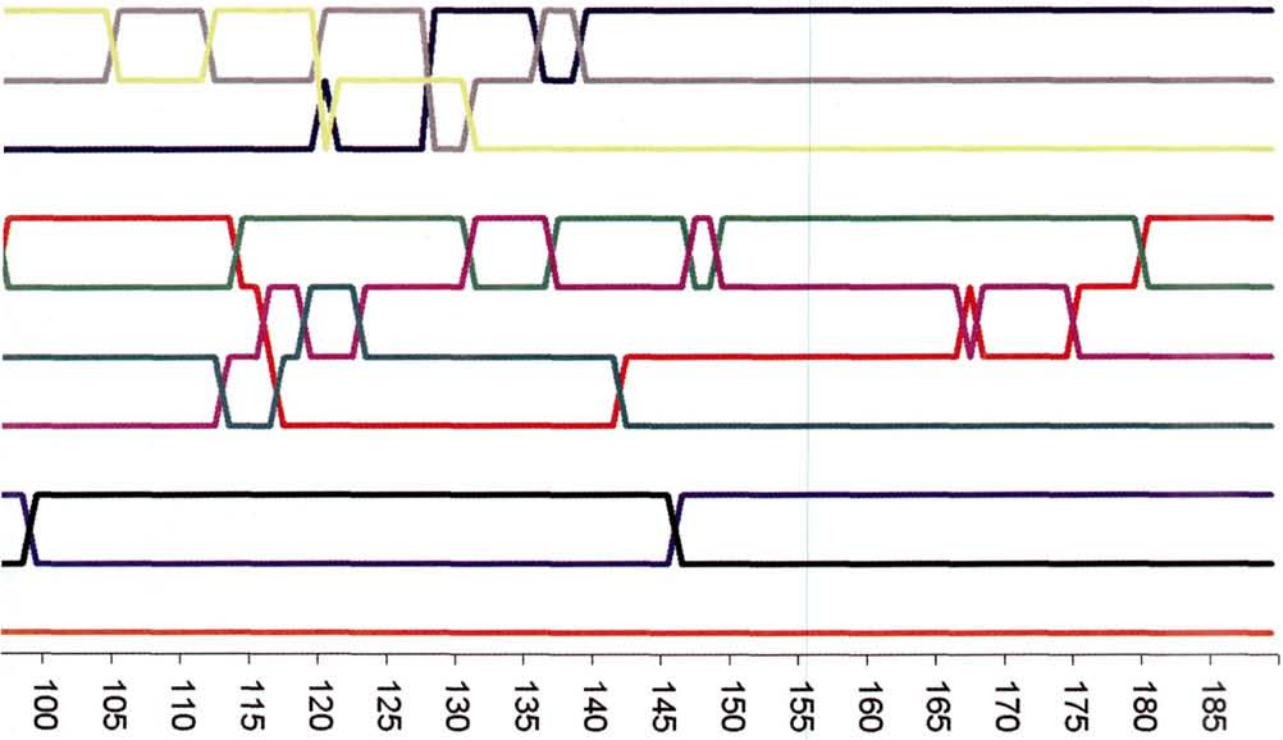
These are some funny-lookin' dogs!



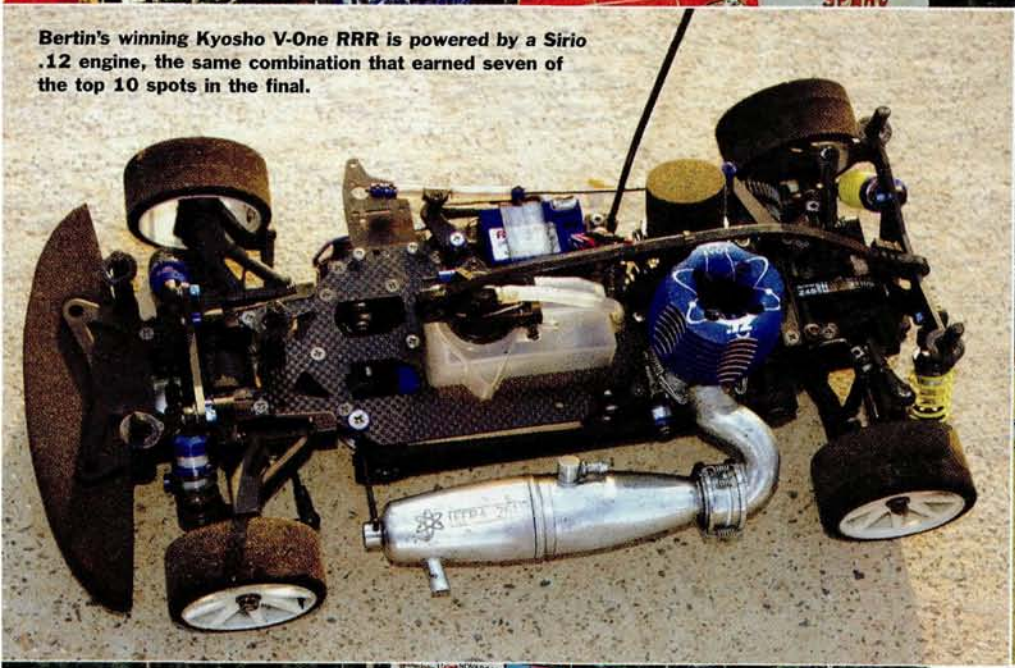
It can't be good for the cars, but racing in the rain looks like a blast.



You'd be running, too, if you had to run your qual while on break from Foot Locker.



This shows the lap-by-lap progression of each racer in the final. You can see that Bertin led until about lap 17, when he dropped to second. He didn't regain the lead until lap 45.



Bertin's winning Kyosho V-One RRR is powered by a Sirio .12 engine, the same combination that earned seven of the top 10 spots in the final.

Bertin shown here cheesin' after his win in the first ever 200mm Worlds Championship.

TAMING THE TRACK

Most tracks are built on a level field and have "better or worse" asphalt, but it isn't too hard to eventually find a good track setup. The Jundiai track is different from anything I've seen: the layout is technical and not too difficult, but the elevation changes make it unique and challenging. Unlike most tracks, its far-away sections, including the back straight, are much lower than the front sections. This is obvious when you look at the track from either end, but you cannot see it from atop the drivers' stand. It takes additional skill to compensate for something you can "feel" but cannot see. Also, the camber of the track constantly changes. Sometimes the track is banked at an angle to allow you to go faster, but there are also some off-camber turns (banked the wrong way), sometimes right next to each other. It takes exceptional skill to drive this track at the fastest possible speed. Many racers were still trying to find a good setup even as they ran the qualifiers.

LOWER FINALS

It was raining hard as the lower finals began, so racers scrambled to find suitable tires and weatherproof their electronics. Everyone at the track crowded around to see what racing in the rain would be like. The cars were slipping and sliding, creating rooster-tails of spray. It was lots of fun for the spectators but not for the drivers. The persistent rain added a significant challenge for the racers who were already struggling for pace. Keeping the electronics dry enough to survive just a 20-minute lower final is difficult enough, but driving in the wet was a new experience for which many drivers weren't prepared.

BERTIN ON THE COMPETITION

"I think it was a nice competition—a real competition—as all the best factory drivers were here. This gives a real credibility to the title. I am very proud of our team's work; I want to cheer all the work done by my teammates, and I have a special vote for Josh. If I ever lose a title in the future, I hope it will be to Josh because he surely is one of the best in the world. And I am very proud of our performance for Kyosho and Sirio."

BERTIN ON RACE STRATEGY

"I did not expect that Shimo wouldn't change tires. But then I pushed and was sure I could be much faster. I knew my qualifying tires were 4/10 of a second faster per lap, so I could catch him easily. They also helped save my engine."

Despite the conditions, one of the highlights was UK Serpent driver Mark Green's performance. Though he was 76th overall, he managed to bump his way up through all the lower Mains to the next day of competition and an opportunity to earn a spot in the Final.

QUARTERFINALS

The sun was shining when the B Quarterfinal started. A nice start, but after one lap, Paulo Morganti got tangled up in traffic, spun around and was quickly way back in the pack. The running order was Flavio Elias, Mark Green, Mauricio Busnardo and Mike Swauger. Elias crashed into a lapped car, and his car was taken to the pits for repairs. Shortly after, Swauger got into a wreck and his car wouldn't move—its body was pushed in. The turn-marshal tried to stop the engine by plugging the stinger, when a track official ran over, fixed the body and put the car back on the track. Swauger was now at the back of the running order. Then it was Green out front, as Swauger battled Elias for second. When time ran out, Mark Green won with 61 laps, Swauger was second with 60, and Flavio finished third with 60 laps, too. All advanced into the B Semifinal.

The A Quarterfinal started after a slight delay due to a transponder problem. Steve Olanier in car number 1 flamed out at the starting line and started from the pits. The initial running order was Fabio Domanin, Teddy Syach, Reto Koenig and Carlos Peracho Heras. The crowd rooted for Syach—yelling and cheering him on! Domanin, meanwhile, had problems and flamed out a few times. Heras moved up, and it was Heras, Niki Duina, Syach and Olanier. With minutes to go, a pass made by Syach got him to third, but then he spun out and had to do it again. With 1 minute left, Syach clearly had the faster car and took the third bump-up spot, leaving Olanier behind.

SEMIFINALS

The cars near the front of the B Semifinal had a clean start, but it was a mess in the back half of the field. Takuya Ito led early, but Mark Pavidis soon took over with his Associated Nitro TC3. A lengthy pit stop for Pavidis gave Ito the lead again followed by Craig Drescher, Swauger and Green. At 9 minutes into the half-hour race, it was Drescher, Ito, Swauger and Green. Pavidis flamed out, and Ito had problems. Swauger led; Green tried to catch him, followed by Craig. Swauger pitted and spun out coming out of the pits but quickly recovered. Green took over the lead with Swauger second and Drescher third. Halfway through, Swauger tangled with a lapped car but recovered without losing much time. But his car just didn't seem to be as fast anymore. With 9 minutes left, it was Green, Drescher, Swauger and Elias farther back. Several cars came into the pits with problems: Swauger's looked as though it had flamed out, then Drescher's came back and was out. Swauger's car had a broken throttle servo. With 4 minutes left, it was Green, Tosolini and Elias. Elias's stop-and-go penalty with less than 2 minutes to go put him out of contention for a bump spot. Green and Tosolini advanced to the final, and Chaussard had a shot at third place. Mark Green deserves special mention here: he started out in the lower final and advanced all the way to the Final! He raced in the rain and when it was dry, and he possibly had the best-performing Serpent at the event!

At the end of the A Semifinal, Niki Duina had repairs to do, as he had missed one of the first rules of racing: do not break your car in warmup. Salven had asked for 10 minutes to repair

WINNERS

Fin.	Qual.	Laps	Driver	Country	Car	Engine	Pipe	Radio	Tires	Fuel	Body
1	1*	190	Adrien Bertin	Luxemborg	Kyosho V-One RRR	Sirio S12TRPI	Sirio 2611	Airtronics M8	GRP	Sirio	Protoform Mazda 6
2	4*	188	Takaaki Shimo	Japan	Kyosho V-One RRR	Sirio S12TRPI	Sirio 2611	Airtronics M8	GRP	Sirio	Protoform Mazda 6
3	6	185	Chris Tosolini	USA	Kyosho V-One RRR	Sirio S12TRPI	Sirio 2611	Airtronics M8	GRP	Sirio	Protoform Mazda 6
4	3*	184	Josh Cyrul	USA	Kyosho V-One RRR	Sirio S12TRPI	Sirio 2611	KO Propo EX-10	GRP	Sirio	Protoform Mazda 6
5	9	184	Ken Furukawa	Japan	Kyosho V-One RRR	Sirio S12TRPI	Sirio 2611	Airtronics M8	GRP	Sirio	Protoform Mazda 6
6	76	183	Mark Green	Great Britain	Serpent 710	Mega ZX-12	Mega 2607	Airtronics M8	Ellegi	Runner Time	Protoform Mazda 6
7	2*	182	Francesco Tironi	Italy	Kyosho V-One RRR	Sirio S12TRPI	Sirio 2611	Airtronics M8	GRP	Sirio	Protoform Mazda 6
8	5	179	David Spashett	Great Britain	Kyosho V-One RRR	Sirio S12TRPI	Sirio 2611	KO Propo Vantage EII-R	GRP	Sirio	Protoform Mazda 6
9	11	167	Michael Salven	Germany	Serpent 710	Mega ZX-12	Mega 2607	Airtronics M8	Ellegi	Runner Time	Protoform Mazda 6
10	21	124	Teddy Syach	Indonesia	Kyosho V-One RRR	Sirio S12TRPI	Sirio 2611	Airtronics M8	GQ	Sirio	Protoform Mazda 6

* The top four qualifiers were guaranteed a grid position in the final.

some earlier damage to his Serpent 710. He finished in time to make the Semifinal, but he needed to put in a solid drive against some of the best drivers in the world to make it from his 11th starting position on the grid to one of the bump spots at the front of the pack. At the beginning, it looked like a David Spashett show. His Kyosho was way out front followed by Barry Baker, Salven (who amazingly gained eight positions) and Ken Furukawa. Salven and Baker got together in a turn, and Salven left Baker behind. Furukawa then tried to pass Salven, became tangled and had to make up ground to catch Salven again. It was Spashett, Salven and Teddy Syach. Then Syach led, but both Spashett and Salven came up on him. Syach went wide and gave Spashett room to pass, but with Salven after him, Syach just went faster. With 15 minutes to go, it was Spashett, Syach and Salven; with 10 minutes left, Salven was second and Syach was back and just pushed harder. The crowd loved it—yelling and cheering every time they passed each other. At the end of the race, Spashett got 95 laps and Syach and Salven got 94. The crowd went wild! I later learned that, in addition to being a fine racer, Teddy Syach is a famous television personality in Asia. You don't see that every day.

FINAL

Adrien Bertin's Kyosho/Sirio machine took off in the lead. Francesco Tironi was second, but he dropped to last after a problem on lap 5. Eight minutes in, on lap 17, Josh Cyrul, who had been shadowing Bertin, went by, and now Bertin followed. It was Cyrul, Bertin and Takaaki Shimo. About 11 minutes in, Salven's car went flying quite high up into the air. Tosolini had meanwhile worked his way back to the front past Shimo to take third. At 17 minutes in, Bertin retook the lead, and Cyrul was a short distance back, followed by Tosolini—all wheeling Kyosho cars. Cyrul closed the gap and retook the lead at 22 minutes into

The Gear that Won the Worlds

TEAM KYOSHO

These guys didn't just win the Worlds, they dominated it! Serpent put a pair of 710s into the big show, but the other eight were all Kyosho V-One RRRs.

SIRIO

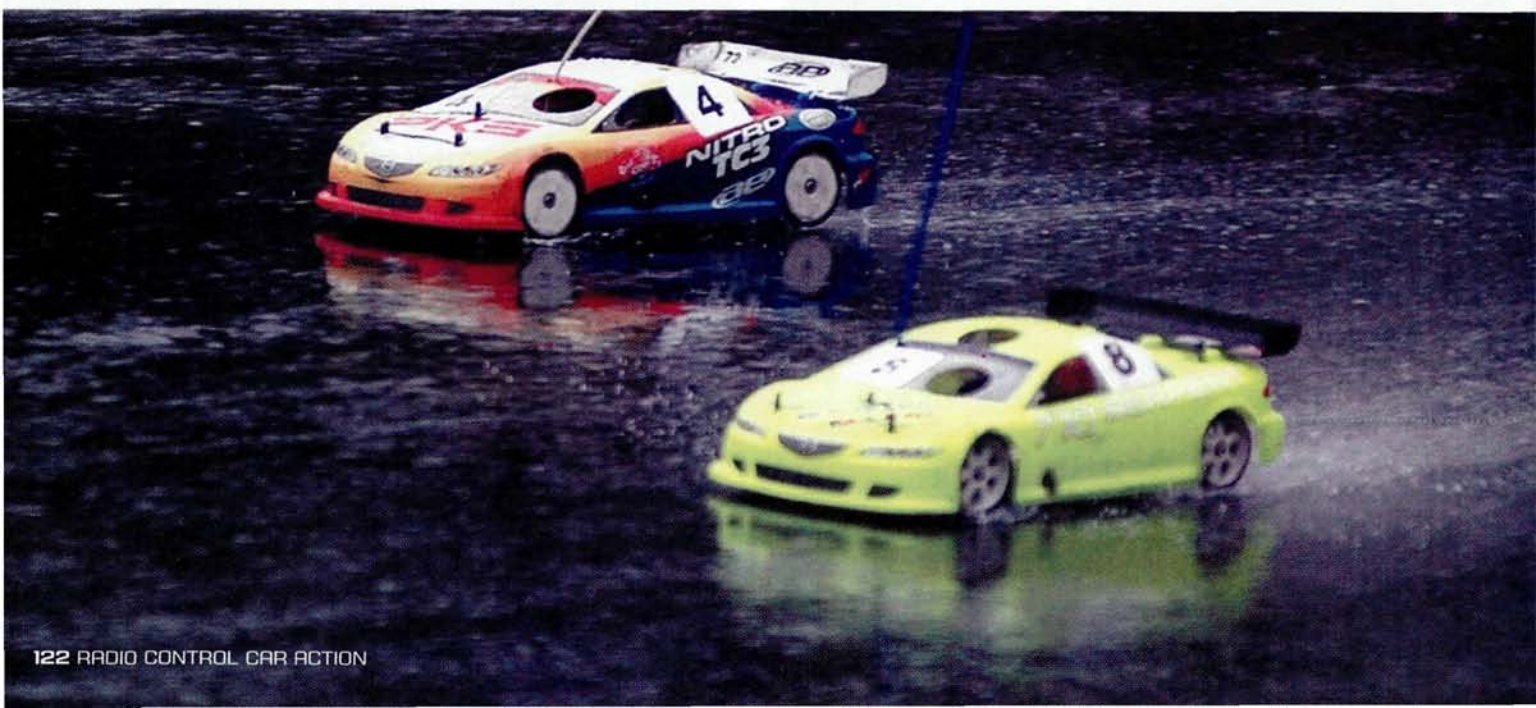
Italian superpower Sirio was another big winner. Sirio engines powered eight of the 10 cars in the Final, including that of winner Bertin.

AIRTRONICS

It's another "eight out of 10" deal; Bertin plus seven other guys raced in the Final with Airtronics' Classic Pro radios.

PROTOFORM

We saved the biggest winner for last. Protoform Mazda 6 shells swept the Worlds—no other body turned a lap in the final. You couldn't win without one!



the hour-long race. Syach had a problem on lap 45; Tosolini's car did something unexpected, and Syach's car hit him. It didn't hurt Tosolini, but a damaged rear pulley on Syach's car forced him to come in for lengthy repairs. Halfway through the race, many drivers brought their cars in for a tire change—but not Shimo. Would this give him a time advantage? Salven started to have problems: he spun out once, flamed out on the back straight and was given a stop-and-go penalty. Then Cyrul's V-One RRR was carried back to the pits. His car and Spashett's had the same problem: the pressure line that runs from the muffler to the fuel tank came off and caused the fuel mixture to go lean. At 39 minutes into the race, the running order was Shimo, Tosolini and Bertin. Shimo was fast, but Bertin, after his tire change, was faster yet, and he quickly closed in on the front-runners. Cyrul was the only racer who could run with Bertin, and though he got by Furukawa, he was six laps down from Bertin when the race ended.

The Kyosho/Sirio team totally dominated! It had eight of the top 10 cars in qualifying, and after the bump-up process had sorted itself out, eight Kyosho/Sirio cars were in the final ... and finished 1, 2, 3, 4, 5. Well done!

The 2004 IFMAR Nitro Touring Car On-Road Worlds was a fantastic event. The Jundiai group did a superb job; lots of difficulties were overcome, and everything worked out great! The track was challenging—as a world championship track should be, and the facilities were first rate. And despite horrible weather midweek, it was wonderful! I think everyone will remember this championship for a long time. ■

A race like the IFMAR 2004 Nitro Touring Car Worlds doesn't just happen; it takes a lot of hard work and organization from people such as ...

Race director	Sander de Graaf
Assistant race director	José Roberto Machado
IFMAR referee	Dallas Matthiesen
FAMAR referee	Manolo Vasques
FEBARC referee	Sergio D'Angelo Moraes
Technical directors	Armando Nascimento, Rafael Alves de Souza
Assistant technical director	Claudio Margini
Timing/scoring	Marcelo Daud
Assistant timing	Jose Luiz Pereira
Radio impound	Alexandre Manzona, Marcos Roberto Mayer
Official starter	Helio Mattos
Turn-marshal director	Willian Batista
Announcer	Fabio and Diego Cirello
Registration	Giulianno Lucca
Secretary	Haroldo Negrini
Webmaster	Roberto Viveiros, Cesar Salvadori Jr.
General coordinator	Edgar Ochiai
Press	Cesar Salvadori Jr.

2004 Electric On-road Worlds

HURRICANES MASAMI AND RHEINARD

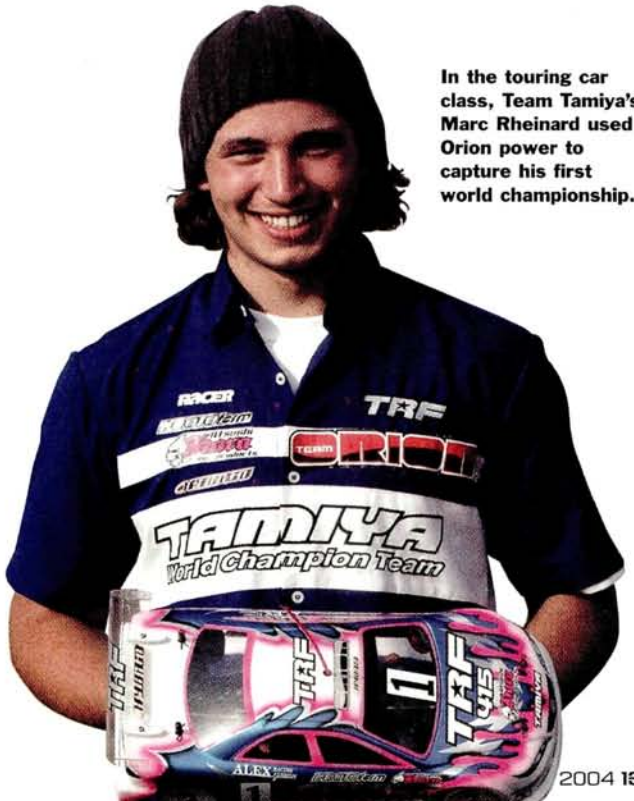
Story & photos by Matt Higgins

SPONSORS: HUDY, XRAY, REEDY, TEAM ASSOCIATED LRP, RAYWOODRCVIDEOS.COM, TAMIYA, YOKOMO

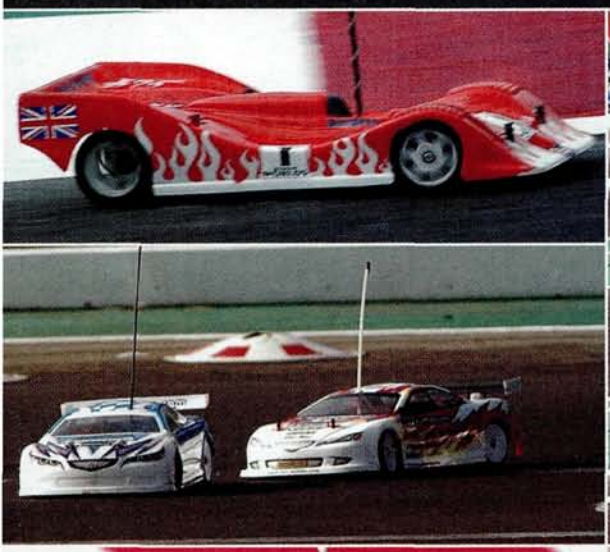
Masami Hirosaka took the win in 1/12-scale with his Reedy-powered Team Associated RC12L4 Yokomo Special.

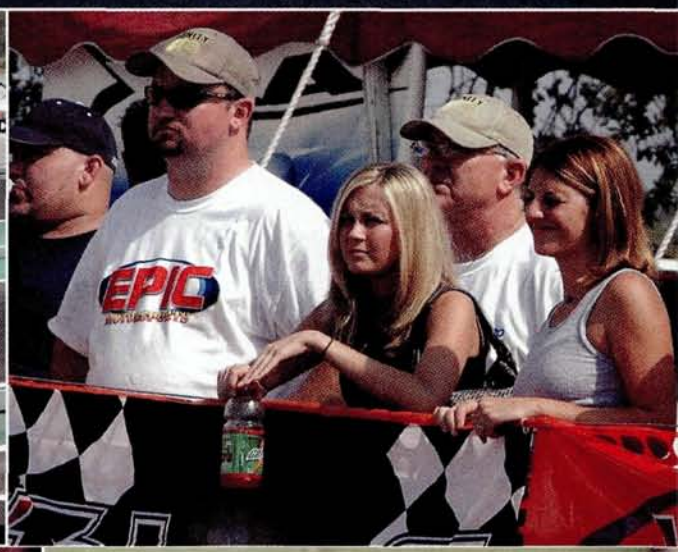
TEAR THROUGH FLORIDA

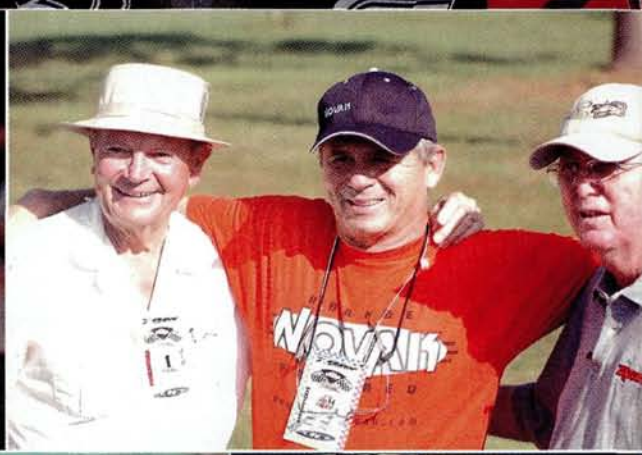
THE 2004 INTERNATIONAL FEDERATION OF MODEL AUTO RACING (IFMAR) Electric On-road Worlds—the race that almost wasn't. The sunshine state is well-known for getting slammed with serious storms, but this year, it was one after another as hurricane heavyweights such as Ivan and Francis ripped through central Florida—the home of the host track: Full Throttle Speedway. The track sustained severe damage, but a race of this importance must go on (it is a world championship, after all). The track owner and crew persevered, and the IFMAR Electric On-road World Championship took place in Kissimmee as scheduled, and like Florida, the 1/12-scale and touring car mod racing was hot, as the world's best drivers gunned for RC's ultimate title.

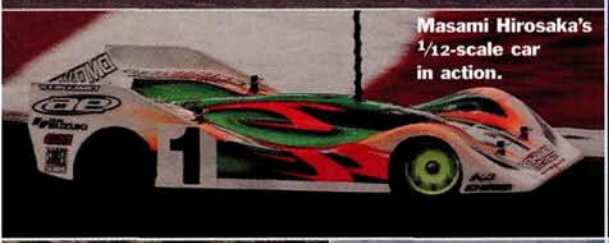


In the touring car class, Team Tamiya's Marc Rheinard used Orion power to capture his first world championship.









Masami Hirosaka's 1/12-scale car in action.

Matt Francis' Team Losi JRX-S prototype sedan.

The 1/12-scale cars had no problem getting airborne off the track's large curbs.

THE FORMAT

The IFMAR Electric On-road World Championship consists of two classes: 1/12-scale modified and modified touring car (ISTC). The 1/12-scale cars ran 8-minute qualifiers and Mains, and the ISTC class ran 5-minute qualifiers and Mains. The entire event takes a week to complete, and the two classes are run separately. First, the 1/12-scale class runs its qualifiers and Mains, and after a day off to reconfigure the track (and maybe give racers a chance to catch their breath), the touring car classes are run. The event concludes with a banquet, some good (and not-so-good) speeches and an award presentation.

THE MAINS

1/12-SCALE MODIFIED

Full Throttle Speedway's large layout made these small, modified land rockets look almost slow—that is, until they hit one of the track's many raised curbs and flew into the air. One of the oldest RC classes, 1/12-scale Pan Car is known as a drivers' class and as a skill builder. One thing is for sure: the drivers whipping these wedges around the track at world championships already have the skills and aren't afraid to prove it.

A1 The legendary Masami Hirosaka driving a Reedy-powered Team Associated RC12L4 Yokomo Special with a Parma EXP Speed 8 shell started on the pole with frequent rival and young gun Atsushi Hara in the two spot using his own Hara Racing Products Hammer 12 with an Orion motor. Only three laps into the race, Hirosaka uncharacteristically missed a turn in the middle of the chicane following the long back straight and jumped his car squarely off a curb. This allowed Hara to easily inherit the lead, and he extended it when Hirosaka bobbled for a second time. Ironically, when Hirosaka, who is famous in the RC world for his amazing precision driving, missed the turn, he missed it completely. After the second bobble, Hirosaka settled down and set his sights on Hara. No one else was close enough to challenge for the lead, so it came down to a familiar battle between these drivers. At the halfway mark, with four minutes to go, Hirosaka had closed in significantly, but by the two-minute mark, Hirosaka had completely eclipsed Hara's lead and was only inches off the leader's rear bumper. In almost every corner, Hirosaka challenged for the lead by aggressively diving into the corners, and each time, Hara closed the door and prevented the pass. Lap after lap, the two drivers dueled—often within an inch of each other; it was amazing that there wasn't contact. On the last lap, as the two neared the finish line, Hirosaka and Hara finally hit. Hirosaka got the better end of the collision and moved on to take the win; Hara took second. Yutaka Takizawa, also of Japan, put his Xenon Racing XR12 in third and was the only other driver to finish on the lead lap.

A2 The second Main had a crash-filled start that seemed to involve everyone but Hirosaka and Hara. These two drivers broke out from the pack and took off. This time, Hirosaka didn't make any mistakes and pulled away. Barring getting involved in a crash or making a significant bobble, Hirosaka appeared to have the race in hand. Hirosaka's lead looked huge, and at one point, it looked as if Hara might have given up or possibly used up his equipment after trying to charge hard early in the race. Then, late in the race, Hara began to very slowly reel Hirosaka in. With eight cars battling for positions in front of Hirosaka and Hara, it looked as if lapped traffic would play a role in the outcome of the World Championship as the two drivers caught the field and set themselves up to pass the slower cars. Everyone yielded to Hirosaka, and he seamlessly overtook each car, but no one seemed to give Hara an inch. As Hara helplessly watched Hirosaka pull away with a clear track in front of him, he desperately tried to pass cars on the inside and outside. Eventually, Hara ran out of track and was taken out by lapped

THE CHAMPS: PAST & PRESENT

YEAR	CHAMPION	COUNTRY	VENUE	CLASS
1982	Arturo Carbonell	USA	USA	1/12-scale Modified
1982	Kent Clausen	USA	USA	1/12-scale Stock
1984	Tony Neisinger	USA	Denmark	1/12-scale Modified
1984	Bud Bartos	USA	Denmark	1/12-scale Stock
1986	Tony Neisinger	USA	USA	1/12-scale Modified
1988	Masami Hirosaka	Japan	The Netherlands	1/12-scale Modified
1990	Chris Doseck	USA	Singapore	1/12-scale Modified
1992	Tony Neisinger	USA	USA	1/12-scale Modified
1994	David Spashett	England	France	1/12-scale Modified
1996	Masami Hirosaka	Japan	USA	1/12-scale Modified
1998	Davis Spashett	UK	UK	1/12-scale Modified
2000	Masami Hirosaka	Japan	Japan	1/12-scale Modified
2000	Atsushi Hara	Japan	Japan	ISTC
2002	Masami Hirosaka	Japan	South Africa	1/12-scale Modified
2002	Surikarn Chaidajsuriya	Thailand	South Africa	ISTC
2004	Masami Hirosaka	Japan	USA	1/12-scale Modified
2004	Marc Rheinard	Germany	USA	ISTC

RACE FACES


Billy Easton
8th ISTC, USA


Ryota Takahashi
7th 1/12-scale, Japan


Michael Lufaso
5th 1/12-scale, USA


Daisuke Yoshioka
3rd ISTC, Japan


Marc Rheinard
1st ISTC, 10th 1/12-scale, Germany


Matt Francis
7th ISTC, USA


Juho Levanen
5th ISTC, Finland


Mike Blackstock
3rd 1/12-scale, USA

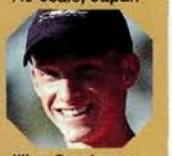

Surikarn Chaidajsuriya
9th ISTC, Thailand

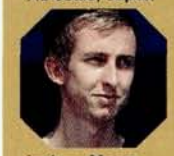

Hideo Kitazawa
8th 1/12-scale, Japan


Yutaka Takizawa
6th 1/12-scale, Japan


Masami Hirosaka
4th ISTC, 1st 1/12-scale, Japan


Atsushi Hara
2nd ISTC, 2nd 1/12-scale, Japan


Jilles Groskamp
4th 1/12-scale, The Netherlands


Andrew Moore
6th ISTC, UK


Thomas Pumpler
9th 1/12-scale, Austria


David Spashett
10th ISTC, UK

traffic. Hirosaka, who piloted a perfect race, sailed on to take the well-deserved win and his 14th world championship title! Hirosaka ran an impressive 40 laps, and despite his late-race tangle, Hara finished second, a lap down, and Jilles Groskamp of the Netherlands, driving a Calandra Racing Concepts Carpet Knife with Peak power, took third with 38 laps.

A3 With Hirosaka sitting out, it was up to the other nine drivers to decide who would take the last two podium positions. If Groskamp won the third A-main and Hara finished sixth or worse, then Groskamp could take second overall. Before the start of the race, that scenario seemed farfetched, but Hara finished in a surprising seventh. Hara had a tough race and didn't come close to getting a clean run in. Groskamp didn't fare much better and only managed a fifth-place finish. Hideo Kitazawa, however, put on an absolute show with his Xenon Racing XR12. Kitazawa was the only other driver to match Hirosaka with a 40-lap run in the Mains. Mike Blackstock and Mike Lufaso finished second and third, respectively, and both used Reedy-powered Team Associated RC12L4s. When the dust settled, Hara finished second overall, and Blackstock secured third.

TOURING CAR

Although all world championships are important, some are more serious than others. The ISTC is one of those championships: a lot is on the line, and the drivers and the manufacturers know it. It isn't just for fun anymore. Qualifying was a tense time with many nervous teams spectating and speculating on whether they'd make the show. In the end, the field consisted of three Pro4s from HPI, two Losi JRX-S prototypes, two Tamiya sedans (a TRF 415 on the pole and a TB EVO 4), two from Yokomo and a lone Team Associated TC4—certainly a well-rounded field, but some big names were missing.

A1 Pole-sitter Marc Rheinard with his Orion-powered Tamiya TRF 415 took off at the tone and led a 10-car field that first split into two and then into three distinct groups. Up front, it was Rheinard with Masami Hirosaka driving a Reedy-powered Yokomo in close pursuit. Rheinard settled into a consistent pace, and there didn't seem to be any chance that Hirosaka could catch and pass him. Then, Rheinard went too tight on a corner and bobbled going over a curb. This allowed Hirosaka to take the lead—but only briefly. With jaw-dropping quickness, Rheinard closed the gap and eventually passed Hirosaka with absolute ease. Back in the pack, Surikarn Chaidajsuriya driving a Peak-propelled Tamiya sedan looked to have third in hand until he dropped out with about 30 seconds remaining, and that left HPI Pro4 pilots Atsushi Hara and Daisuke Yoshioka to battle for the position. On the last lap, Yoshioka bested Hara by less than 4/10 second.

A2 This was the race that no one expected—most of all Rheinard, who had a rough start at the tone. By the time he realized what had happened, Rheinard had fallen back to fourth place. Up front, Yoshioka and Hara had an extremely close battle for first. Hara's car seemed to be faster than Yoshioka's—but not fast enough to pass the leader's defensive driving. Though this must have been frustrating for Hara, it was a great

TRACK TALK

"I was confident but also nervous after the second Main."
—Marc Rheinard on how he felt going into the third ISTC A-main.

"This sucks. I didn't come here to run eighth."
—Billy Easton describing how frustrated he was with his finish in the ISTC class.

"We beat the funny cars."
—Dale Epp on his Protoform Mazda 6 body winning the ISTC World Championship.

"All it takes is a bobble."
—Mike Reedy on how competitive the field is and how easy it is for someone to lose a race.

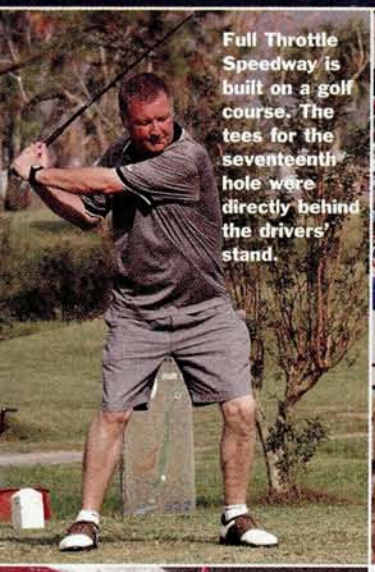
"It was just hard racing. I just concentrated on driving my line, and I think Masami just drove in full throttle."
—Atsushi Hara on the contact with Masami Hirosaka in the first 1/12-scale A-main.

"You get a feel for the track and what it's all about"
—Tom Esposito on the benefits of running 1/12-scale and the touring car class.

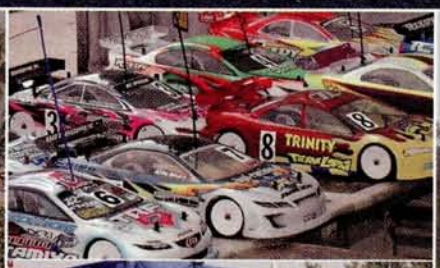
"As long as I beat Hara, everything's all right, and he's the same way."
—Barry Baker on the friendly rivalry with Atsushi Hara.

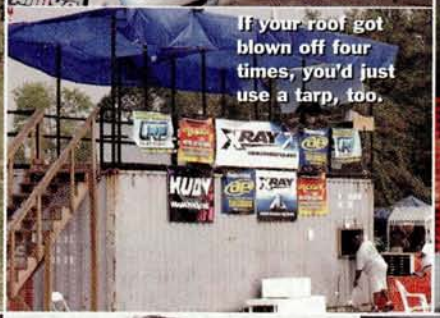
"We don't want to be another 'me too' company."
—Gil "Pops" Losi Sr. on the unique JRX-S prototype car.

"I'm very happy. I'm very, very happy."
—Marc Rheinard on how he felt winning his first world championship.

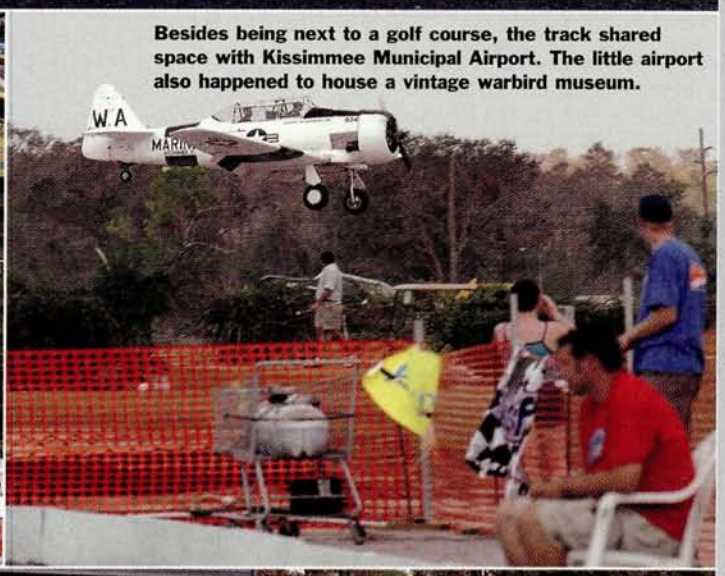


Full Throttle Speedway is built on a golf course. The tees for the seventeenth hole were directly behind the drivers' stand.

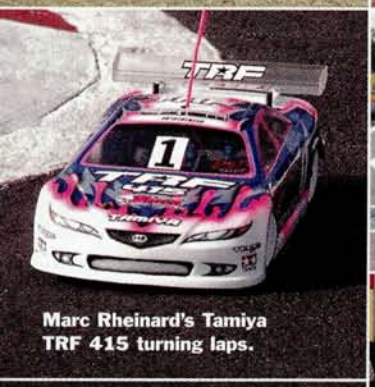




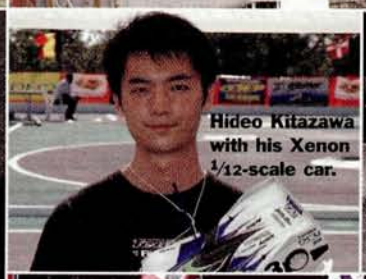
If your roof got blown off four times, you'd just use a tarp, too.



Besides being next to a golf course, the track shared space with Kissimmee Municipal Airport. The little airport also happened to house a vintage warbird museum.



Marc Rheinard's Tamiya TRF 415 turning laps.



Hideo Kitazawa with his Xenon 1/12-scale car.

Florida is a hot spot for custom or "tuner" cars. Some were better than others.

WINNERS

Class: 1/12-scale Modified

Fin.	Qual.	Driver	Chassis	Motor	Battery	ESC	Radio	Tires	Pinion/spur
1	1	Masami Hirosaka	Associated RC12L4 Yokomo Special	Reedy Ti 10x2	Yokomo Z3300 HVR	GM SX-12 World Special	KO Propo Esprit II	TRC/Yokomo	29/90
2	2	Atsushi Hara	Hara Hammer 12	Orion Hara Edition 10x2	Orion GP 3300	Hara Twister 2	KO Propo	Jaco	27/96
3	4	Mike Blackstock	Associated RC12L4	Reedy	Reedy	Novak GTX	KO Propo Helios	Jaco	28/93
4	4	Jilles Groskamp	CRC Carpet Knife	Peak Vantage	Peak GP 3300	Nosram	Sanwa	CRC/Jaco	27/96
5	5	Mike Lufaso	Associated RC12L4	Reedy Ti 10x1	Reedy Real Time	LRP QC2	KO Propo Helios	Yokomo	30/94
6	6	Yutaka Takizawa	Xenon XR-12	Xenon Hades 9x3	Fusion	Futaba MC800C Ver. 2	Futaba 3PK	Jaco	25/90
7	9	Ryota Takahashi	Xenon XR-12	Xenon Hades 9x3	Fusion	Futaba MC800C Ver. 2	Futaba 3PK	Jaco	25/90
8	7	Hideo Kitazawa	Xenon XR-12	*	Pro-match GP3300	Futaba MC800C	Futaba 3PK	Jacot	26/90
9	10	Thomas Pumpler	Associated RC12L4 Yokomo Special	Orion V2	Orion GP 3300	Robitronic	Sanwa	Yokomo/TRC	29/96
10	7	Marc Rheinard	CRC Carpet Knife	Orion V2	Orion GP 3300	Hara Twister 2	Sanwa M8	CRC/Jaco	28/98

**Information not supplied by driver*

Class: ISTC

Fin.	Qual.	Driver	Chassis	Motor	Battery	ESC	Radio	Tires	Body
1	1	Marc Rheinard	Tamiya TRF 415	Orion V2 7x1	Orion GP 3300	Hara Twister 2	Sanwa M8	Handout	Protoform Mazda 6
2	3	Atsushi Hara	HPI Pro4	Orion Hara Edition 7x1	Orion GP 3300	Hara Twister 2	KO Propo	Handout	Ride
3	2	Daisuke Yoshioka	HPI Pro4	LRP Fusion	LRP 3300	LRP QC2	Sanwa M8	Handout	Tamiya
4	4	Masami Hirosaka	Yokomo MR4 SDW	Reedy	Yokomo Z3300 HVR	GM SX-12W	KO Propo Esprit II	Handout	Yokomo
5	10	Juho Levanen	Associated TC4	Reedy	Reedy GP 3300	LRP QC2	Sanwa	Handout	Protoform Mazda 6
6	7	Andy Moore	HPI Pro4	Orion 7x1	Orion GP 3300	Nosram	*	Handout	Protoform Mazda 6
7	8	Matt Francis	Losi JRX-S	Trinity D6 8x4	Trinity GP 3300	LRP QC2	Airtronics M8	Handout	Yokomo Stratus
8	6	Billy Easton	Yokomo MR4TC-SD	Reedy	Yokomo	LRP QC2	Futaba	Handout	Yokomo Stratus
9	5	Surikarn Chaidajsuriya	Tamiya TB Evo 4	Peak Vantage	Peak	Futaba	Futaba	Handout	Protoform Mazda 6
10	9	David Spashett	Losi JRX-S	Peak	Peak	LRP	KO Propo	Handout	Protoform Mazda 6

**Information not supplied by driver*

THE TRACK

Full Throttle Speedway is the type of track that all on-road racers wish they lived near. It's a huge, permanent track with many possible configurations. Since Full Throttle Speedway sees mostly nitro action, the full course wasn't used, and a smaller layout for the Electric On-road Worlds was designed. The 1/12-scale class ran the course in a counterclockwise direction, and the touring cars ran clockwise. For the touring car race, the chicane that the smaller, more agile 1/12-scale cars navigated before entering the back straight was removed so the cars would have a cleaner start off the straight.

1. The back straight is where all the action started. The 1/12-scale cars took off counterclockwise and dived into a chicane. The touring cars made a hard right coming off the straight.

2. This is the section that was altered for the touring cars. After making a hard right off the straight, they made a quick left and then blasted down a short straight.

3. This is where the scoring and timing loop is.

4. These two chicanes proved to be the trickiest part of the track, and a lot of passing took place in this section for both classes.

battle to watch. A remarkably similar battle took place for the third spot. Hirosaka was doing everything he could to hold off the hard-charging Rheinard, who undoubtedly had the fastest car of the field. At times, the duels looked like a four-way battle for the lead, as they all occasionally closed together. In the end, Yoshioka took first followed by Hara with Hirosaka in third. On the last lap, after time had run out, Rheinard made an aggressive pass to overtake Hirosaka. A five-second penalty was issued, and this bumped Rheinard all the way back to fifth and Team Associated TC4 driver Juho Levanen into fourth.

A3 The second Main proved that under the right circumstances (such as hacking at the tone) the incredibly fast Rheinard could be beaten. In the third Main, he set out to demonstrate his dominance over the field and to win his first world championship. From the tone, it was all Rheinard, and he powered onto a largely uncontested victory. Back in the pack, positions were much more hotly contested; the top four all finished on the lead lap. Again, a late-race aggressive pass would play a role in the outcome of the race and the world championship. This time, it was Yoshioka making contact with Hirosaka. Because the penalty took place after time had expired on the final lap, the 10-second penalty was issued postmortem. The hefty time fine dropped Yoshioka down to seventh and to third overall. Hara got bumped up to second in the Main and second overall.

THE WRAP-UP

As touring car racing enjoys immense popularity, the IFMAR Electric On-road Worlds is truly a significant event in RC. Much is on the line, and the race serves not only as a source of glory for the winners but also as a proving ground for equipment. With the world's best drivers competing, the 1/12-scale class is a prestigious race to win and victory doesn't come easy. Congratulations to first-time world champion Marc Rheinard and 14-time world champion Masami Hirosaka on their impressive wins. Congratulations also to Tamiya, Orion, Associated and Reedy. ■

RACER NEWS

BY JASON SAMS

RCPRO SERIES
A RACE SERIES LIKE NO OTHER

PRO SERIES CHAMPS CROWNED

The Boggy Creek Raceway in Orlando, FL, hosted the third annual RC Pro Series Championships. It's the grand finale of the series that pits the North, South, East and West regional champs against each other for all the marbles. Here are the winners for each class from the '04 Championships and the overall standings. For the 2005 schedule, click over to rcproseries.com.

CLASS	DRIVER	VEHICLE
Unlimited Monster Truck	Rusty Mihelich	Kyosho K2 Truggy
Production Monster Truck	Bobby Moore	Traxxas Revo
Expert 1/8 Buggy	Greg Degani	Kyosho MP 777 Special 1
Expert 1/10 Gas Truck	Jesse Robbers	Team Losi Triple-XNT Drake Edition

2004 OVERALL CHAMPIONS

Production Monster Truck	Bobby Moore	Traxxas Revo
Unlimited Monster Truck	Marty Korn	GS Racing SUT Pro
1/10 Gas Truck	Jesse Robbers	Team Losi Triple-XNT Drake Edition
1/8 Buggy	Chris Crews	Mugen MBX-5

MEANWHILE, IN EUROPE

>>> XRAY PLAYS INSIDE

An XRAY XB8 piloted by Markus Feldmann won the Indoor Off-Road Challenge Race held at the Rheinberg Toy Fair in Germany. Second went to Samuele Lenzi, who ran a Kyosho MP 777, and third went to Mikael Palsson running a Mugen MBX-5 ProSpec. Eighth-scale indoors? We hope they had powerful fans, and we don't mean the people in the stands.

>>> SCHUMACHER SWEEPS SWISS

Schumacher's Markus Greter, Patrick Birchmayer and Raphael Wicki drove Mi2s to the top three spots at the Nicklaus Cup in Switzerland.

>>> CONGRATULAZIONI ASSOCIATO

Team Associated's Riccardo Rabbati just won the Italian Touring Car Carpet National Championship with a freshly built TC4.

SURIKARN NOW WITH HPI

2002 ISTC World Champ Surikarn Chaidajsuriya has moved to HPI from Tamiya and will run the Pro 4 and the R40 for the '05 racing season. Surikarn will continue to power his cars with his signature series Peak Vantage motors and Peak GP3300 SP cells.

KAWAMOTO TAKES KYOSHO MASTERS

Japan: Kyosho's Atsushi Kawamoto was able to win over a talented field of 1/8-scale racers at the fifth annual Kyosho Masters Race. Second went to Portuguese driver Miguel Matias, and the Japanese racer Masao Tanaka finished third. U.S. racers Jeremy Kortz and Greg Degani finished fourth and ninth, respectively. Kortz won the first two of the three-race-Main format handily, but unfortunately, his rear suspension arm broke during A3 when the finishing points were doubled. A solid finish in the final Main would have secured the victory for Kortz, who was driving on another level, according to race fans.

TEAM ASSOCIATED SPONSORS 1/18-SCALE NATS

You heard that right! All you 1/18-scale fans can race your minis at the 2005 Nationals at RC Madness in Enfield, CT. The race will be run the weekend of April 1 through 3, and you can find the entry form in this issue or download it from rcmadness.com. There will be Stock, Modified and Brushless classes split between 2WD and 4WD trucks, plus a "Fastest 1/18-scale" competition. Along with all the mini-action, there will also be a 1/10 stadium race and an E-Maxx class if you wanna run the "big" stuff. For more info, visit rcmadness.com and rc10.com.

HARA BIG IN JAPAN

HPI's Atsushi Hara won the JMRCA Japanese EP National Touring Car Championships while besting Yokomo's Masami Hirosaka (second) and HPI teammate Daisuke Yoshioka (third). Surikarn Chaidajsuriya made his debut as an HPI driver at the event and managed to finish 11th overall. Expect better finishes to come; although Surikarn is still learning the car, he managed to throw down some laps as fast as the leaders'.

CYRUL DOMINATES CLEVELAND NATS

Josh Cyrul was The Man at the Cleveland Indoor Nationals. He won 1/10-scale Modified from second on the grid with his XRAY T-1 Factory car and beat TQ Paul Lemieux in the process. Paul hung on to put his new Losi JRX-S into second, and third went to Team Losi/Epic's Mike Dumas. We'll have complete coverage next month.

GOT A STORY FOR RACER NEWS? Contact Jason Sams at jasons@airage.com.

RACERS' RIDES

Jimmy Babcock
>> Lexus IS300

"JB" of Hot Rod Hobbies/Team Losi/Team Trinity fame just bought this Lexus IS300 with the "sport package." The loaded ride includes plush white leather interior and panels, a six-disc CD changer, eight speaker bumps, 18-inch Moda wheels and a fresh, medium-dark window tint that's sure to get Jimmy hassled by the inevitable CHP pullover. From the look

of things, the JBRL (Jimmy Babcock Racing League) and Hot Rod Hobbies must be doing very well.

SITE SEEING

GSRACING.COM

We don't usually feature manufacturers' websites because everybody already knows about them (just add ".com," and you're there), but GS Racing gets a bone for its new buy-direct feature. You can now buy GS kits, hop-ups and gear directly from the new website. Other cool pages include GS News, Support (downloadable tips) and a links page.

Josh Cyrul's
XRAY T1 Factory

RACE: U.S. INDOOR CHAMPS MOD TOURING WINNER

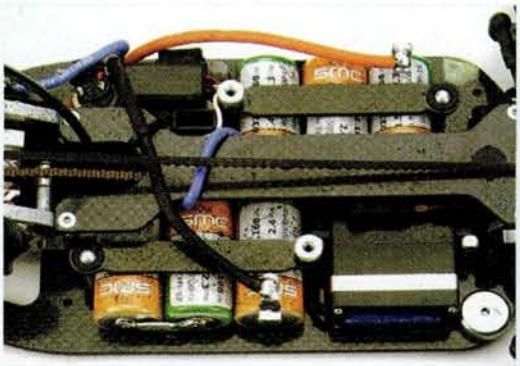
EQUIPMENT

Transmitter: KO Propo Helios
Receiver: KO Propo KR
Steering servo: KO Propo PDS-2363
ESC: KO Propo VFS-1
Battery: SMC GP 3300
Motor: Fantom Vortex 7-turn single
Tires (F/R): Jaco double-purple/Jaco pink
Tire additive: Paragon
Body: Parma Alfa
Pinion & spur: 18/96

SETUP	FRONT	REAR
Camber	2 deg. negative	2 deg. negative
Caster	3 deg.	-
Toe	2 deg. out	3 deg. in
Ackerman position	1	-
Ride height	4mm	4.5mm
C-hub	M	-
Downstop	0	5
Wheelbase setting	-	6
Roll center	4/3	6/5
Ball-stud shim	1mm	2mm
Shock type	Plastic	Plastic
Shock oil	70WT	35WT
Shock piston	4 holes open	4 holes open
Shock spring	Light purple	Violet
Upper-shock mount	3	4
Lower-shock position	-	2
Camber link (tower)	2	2
Roll bar	7mm	-
Battery placement	B	-
Servo placement	S	-
Transponder placement	T	-
Ballast	10g (right front)	-
Tire diameter	56mm	56mm
Diff/one-way	Diff	-

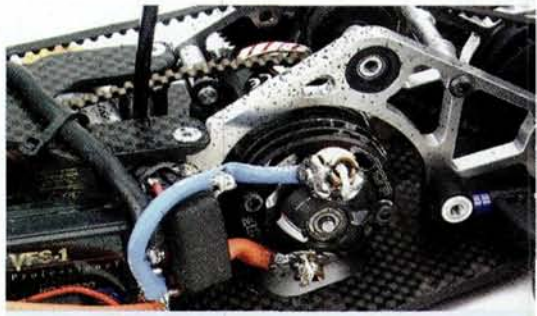
FACTORY OPTIONS

- 3.5mm graphite chassis
- Carpet front shock tower
- Graphite steering extensions (prototype)
- Aluminum rear hub carriers
- Ultrastiff graphite upper deck



Josh likes to keep the wires as short as possible for efficient power flow. The tiny KO VFS-1 ESC is mounted behind the receiver under the upper deck. Josh had to add ballast to bring his car up to the minimum weight requirements.

The aluminum rear hub carriers are optional XRAY parts. Josh didn't want to take any chances on a DNF, so he bulletproofed his ride.



FIND IT
>>> Go to page 250 for manufacturers' contact information

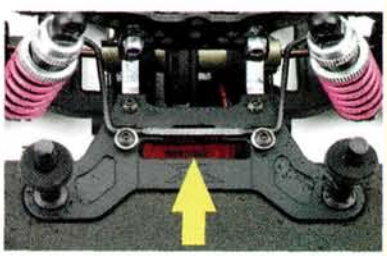
The optional 3.5mm *carbon chassis* makes the car far more rigid for racing on high-traction surfaces. Josh installed a Lexan tray on the chassis to cover the open battery slots. It allows him to mount the speed control and receiver more securely.

Opposite, top: **Josh's car was a rocket down the straightaway, thanks to the Fantom 7-turn single motor and SMC GP 3300 cells. Check out the *monster Schottky* diode installed on the motor wires. It keeps the *motor running* cooler and provides consistent braking.**

Opposite, bottom: **look closely at the steering knuckle, and you'll see prototype graphite arm extenders. This mod changes the car's Ackerman and, according to Josh, it makes the steering a little less sensitive on high-bite carpet. The lightweight hex hubs are from XRAY.**

Factory Driver HOT MOD

Josh installed his personal AMB transponder on the chassis behind the front bumper. This is a very smart location for the transponder because the U.S. Indoor Champs is famous for its photo finishes. Josh wanted to make sure that his transponder crossed the line before the rest of the chassis did.



5 QUESTIONS

DRIVER: JOSH CYRUL

AGE: 26

LAST BIG WIN: U.S. INDOOR CHAMPS MOD TOURING AND MOD 1/12

SPONSORS: CEFX, JACO, SMC, FANTOM, KO PROPO, XRAY, HUDY, COMPETITION ELECTRONICS, KYOSHO, SIRIO, KOLORS BY KROPY

WHEN I'M NOT RACING I LIKE TO: RELAX AND WATCH TV AND MOVIES WITH MY WIFE.

RC CAR ACTION: Congratulations on your killer performance at the U.S. Indoor Champs. Some of the qualifying heats took place during the wee hours of the morning. How in the world did you find time to sleep when you had to prep two cars to stay competitive during qualifying?

JOSH CYRUL: At Cleveland, I always keep to a routine to make sure that I'm ready from round to round. Immediately after a run, I go back to the room, take out the motor and batteries and then do the needed work on and adjustments to the car. This way, the run is fresh in my mind so I can think about things, make the proper adjustments and prepare the car for the next run. Then, I simply relax and wait for the next round—with an occasional nap!

RCCA: In the Mod Touring Car A-main, you took the lead from pole-sitter Paul Lemieux within the first few laps. How did you get around him so fast?

JC: It seemed we all got away with good starts, but on the second or third lap, Paul made a small mistake in the sweeper that pushed him out wide. That allowed me to slide inside and take the lead. From there, it was just a matter of not making any mistakes and holding Paul off.

RCCA: Did you think that you had a shot of winning the 1/12 Mod class after qualifying in fourth place—a full lap down from Mike Blackstock?

JC: Throughout qualifying, I kept trying things on each run to improve the car. On every run, I made up time with quicker laps, but the overall times didn't reflect it because I made my share of mistakes getting used to the car during each run. In the end, I was only about four seconds off Mike's TQ, which appeared as a lap because he made the timeline for 41 laps, and the rest of us were caught with fast, 40-lap runs.

RCCA: At which point during the 1/12 Mod A-main did you realize that you had a *great chance of taking home the championship*?

JC: I honestly thought going into the Main that I had a great shot. The Mains at Cleveland are always a lot different than qualifying because so many people are walking on the track, and there isn't as much constant racing as there is in qualifying, so the traction usually decreases. I adjusted the car for this and was ready for the Main. I had a very good start and jumped into the lead; from then on, it was just a matter of controlling the pace to maintain my lead over the rest of the field.

RCCA: You've had a lot of big changes in your life lately. What's new?

JC: I've had a lot of changes in both my RC and personal life. The RC changes have been exciting, but getting married and now expecting a baby girl with my wonderful wife Angel have been the best things that have ever happened to me. It's amazing how much my outlook on life has changed. I look forward to each day so much more knowing that my daughter's due date grows nearer. I just want to use this chance to thank everyone who has helped me out so much this past year as it has been very tough at times. Sponsors, friends and family, I appreciate everything more than you will ever know. Thank you, everyone! ■

Winning Strategy: Get the Most out of Your Race Weekend

THE INDOOR SEASON IS IN FULL SWING, so I thought I would talk about race strategy this month to help those who will attend big events such as the Snowbird Nationals (February 8 to 13 in Orlando, FL) and the Carpet Nats (May 17 to 20 in West Haven, CT). And if you don't race at big events, my advice applies to racing at the local level, too. The bottom line is that you always want to go into an event as prepared as you can be. It doesn't matter whether it's a club race or a world championship; the more prepared you are, the more time you have to focus on the racing action. Try my tips.

GET THE MOST OUT OF PRACTICE TIME

It's important to know what to focus on during practice. Practice runs at big events are always limited, so make the most of them. Learn to use each run to gather information, and then know how to apply it. For example: your first few practice runs at any big event are basically a waste and good only for learning the track's layout and making sure that your car runs straight and isn't tweaked. The reason for this is that at this time, the track is still "green": traction is very poor compared with how it will be when qualifying starts. If your car pushes a bit in the first practice, this is good because as the bite on the track increases, so, too, will your steering. Don't adjust the chassis because it isn't steering enough; trust the setup you went with, and wait until the second round of practice to judge your car's handling. During the first run, think about things such as your gearing, motor performance, battery run time and the sections of the track on which you feel immediately comfortable. On your second and third practice runs, focus on chassis setup because the track will have gained enough traction for you to gauge your setup.

Practice is not about racing! The most important aspect of these runs is that they give you a chance to evaluate your car and make the required adjustments. Practice isn't about racing the other drivers in the session. Racing usually leads to broken cars, and not finishing a practice session can really put you at a disadvantage for the rest of the event. Concentrate on the following things during practice:

- **Run your car to evaluate its handling.**
- **See whether it has as much acceleration and speed as others on the track.**
- **Determine your "weak" sections and "strong" sections.**
- **Leave the door-to-door racing for the main event.**

QUALIFYING DO'S & DON'TS

I've covered some of this in a previous column, but it doesn't hurt to reiterate these points. Qualifying is usually a progressive affair in terms of lap times and fast runs. In a "best-run" type of qualifying system, rarely does the TQ come from the first round of qualifying. It might not be as important to put in a solid run during the first round as people may have told you. In a "best-run" qualifying system, you basically have as many times as there are qualifying rounds to get things right. Throwing away a round or two looking for the "perfect" setup is a risky strategy, but it can work. On the flip side, I think you should make every run count, and here's why:

››› The chance of getting that perfect setup by changing several settings on your car all at once is very low.

››› If you happen to get that perfect setup, you probably won't be able to adapt quickly enough to it to take advantage of your good fortune.

Only the world's best drivers can get 100 percent out of a new setup within a few laps and not hit anything in the process. For average drivers, it is better to make small changes to the car after each run to improve handling, but most important, you need to get used to driving the car to make the most of the altered setup. You will do better running a setup that is slightly off but with which you're comfortable than landing on a great setup and having 5 minutes to make it all happen.

PHOTOS BY JOHN HOWELL

Of course, in the points system used at some races, a combination of finishes from all rounds determines your qualifying position. In this qualifying system, you have to make the best of each round, no matter what. Qualifying on points demands consistency and rewards drivers who make the best of what they have to work with in every run. Only make setup changes here if your car's handling is way off. Typically, you have only one "throw-out" round in which to experiment, so use it wisely and concentrate on putting together your best rounds in the rest of the qualifying heats.

Remember that you are competing only against the times in the round you are actually in and that every round is essentially a race within a race. Keep an eye on other drivers' qualifying times in the round leading up to your qualifier, and you'll know what you have to shoot for. After the round, put it out of your mind and concentrate on the next one.

QUALIFYING IS NOT A RACE!

Qualifying is not a race against other drivers. It is a race against the clock, which does not reward door-to-door racing. When a faster car comes up on yours, let it pass as soon as you can without giving up any time. It shouldn't take more than a few turns to find a place to let the faster driver go by. On the flip side of that, if your car is faster than another car, you don't have license to drive it off the track because you want to get by. Pressuring the slower driver into making a mistake will only hurt you, as his car will most likely bounce off the board and back into yours, and you'll both lose time. Another piece of driver etiquette is to refrain from immediately jumping on the passing car's rear bumper. Its driver has proven that he's faster by catching you, and he deserves to have some room after the pass.

KNOW THE HANDOUT

Before a big event, always find out which motor will be the handout, and then, if that motor is commercially available, buy one and practice tuning and tweaking it before the race. Gearing and brush setups vary greatly from motor to motor, so don't always count on your usual setup to work with the handout.

FIND YOUR FACTORY REPS

All the major manufacturers are represented at big races, so find the ones you need and pick the reps' brains about setup, tires, bodies, etc. These guys do hundreds of hours of testing and will most likely get you on the right track with only a few minutes of conversation. Also, don't be afraid to take your car over to let them look at it. They may notice that something you've overlooked is wrong. Just be careful to pick the right time to ask questions. These guys race as well as promote and support, so if you see a broken car in front of them, ask when would be a good time to go back and ask a few questions.

MAIN TIME

The main event is where you pit your talent and skills against those of other drivers. Many drivers are great qualifiers, but their racing skills aren't quite as good. Winning main events takes fast lap times and smart decisions.

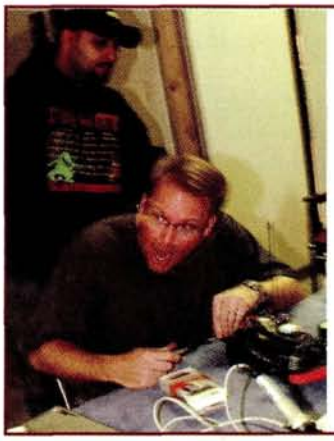
For me, a Main consists of two parts—the start and the rest of the race. The key to getting a good start is pacing with the pack until the first turn. Use the run to the first turn to position yourself for a clean start. Don't be too ambitious in the first turn; instead, wait to see what the others do, as that will open more doors to passing than trying to open one yourself. Never pass on the outside, as nine times out of 10, it will land you in the cheap seats. But if you are in the first two rows on the grid, I expect to hear the sound of plastic on plastic as your trigger snaps back to full throttle!

After the first lap, the race really begins. After a few more laps, you know where you stand. You are either passing cars or getting passed, so you're happy or you wish you'd stayed at Hooters longer the night before. If you're off the pace, make the best of your car and feel good about how you "wheeled" an ill handling car to a good finishing position. The worst thing you can do when your car is not right is to drive "over your head" to try to make up for it and then bounce off every wall and be a moving chicane for the other drivers.

But if your car works well and you can move through the pack, here are a couple of tips to keep you moving towards the front:

››› Never follow too closely when trying to pass because you'll expose your car to the risk of the lead driver making a mistake and bouncing back into your car. Instead, time your pass to happen where you feel most comfortable on the track. Don't initiate a pass immediately on arriving at the other car's rear bumper unless the timing is right.

››› If you're in the lead, run a few hard laps to see whether you can break from the pack, and then set the pace and gauge whether the car behind yours is gaining or not. This is "running only as fast as you have to." The philosophy behind it has gained me more than 30 national championships and two world championships. Always remember that the pressure is on him to catch you and not for you to maintain the lead. Thinking this way will keep you calm enough to finish the race without errors and in the winners' circle.



KNOW THY ENEMY

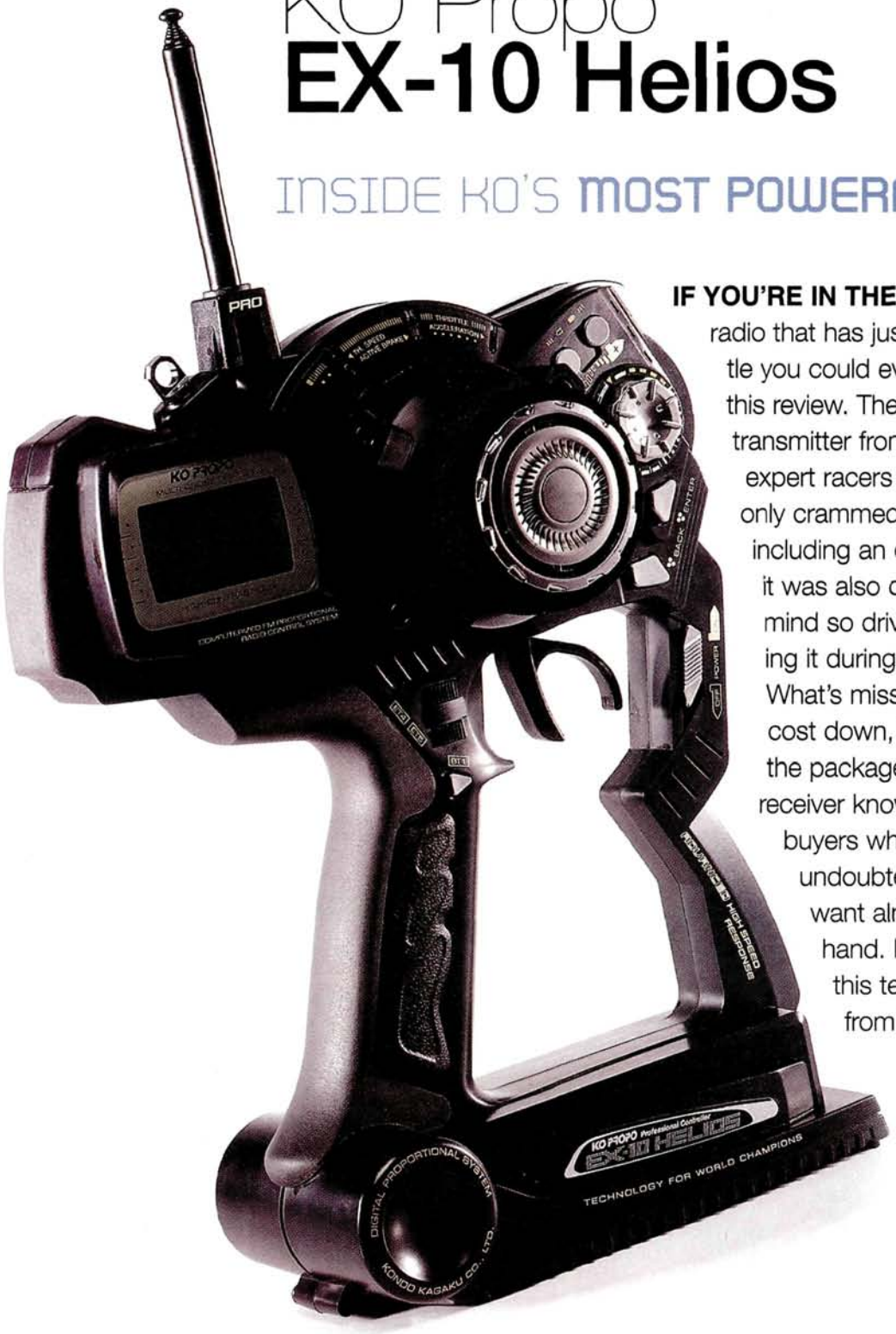
An old saying goes, "Keep your friend close but your enemies closer." Nothing could be truer when it comes to racing. Get to know a few of the drivers in your qualifier so you'll be more comfortable with them on the track. Chat to them before the practice sessions and in the pits. You'll be surprised how nice drivers are to you on the track if they get to know you off the track. Besides, half the fun of being at these big races is meeting new people and making new friends.

By now, I'm sure you've noticed that my racing philosophy is much more conservative than most people's, but on the track, my way of thinking will help you to keep calm and build confidence. Being calm, collected and confident are the keys to making the most of your weekend's racing.

FIND IT
››› Go to page 250 for manufacturers' contact information.

KO Propo EX-10 Helios

INSIDE KO'S MOST POWERFUL PISTOL



IF YOU'RE IN THE MARKET for a high-end FM radio that has just about every bell and whistle you could ever think of, you need to read this review. The EX-10 Helios is the latest transmitter from KO Propo, and it caters to expert racers who want the best. It's not only crammed with the latest technology, including an optional laptop interface, but it was also designed with ergonomics in mind so drivers will be comfortable holding it during those long nitro Mains. What's missing are servos. To keep the cost down, KO Propo decided to sell the package as just a transmitter and receiver knowing that discriminating buyers who look at this radio will undoubtedly have the servo they want already in mind—or even in hand. Let's look at the features on this technological tour de force from KO.

PHOTOS BY PETE HALL & JOHN HOWELL

MANUFACTURER'S SPECIFICATIONS

TRANSMITTER

- **Number of channels:** 3
- **Transmission frequency:** Removable crystals (within the frequency range)
- **Neutral pulse:** 1.5 milliseconds
- **Memory:** EEPROM
- **Supply voltage:** 8 AA batteries
- **Current consumption:** 250mA

RECEIVER KR-302F

- **Reception method:** FM-PPM
- **Number of channels:** 3
- **IF (incoming frequency):** 455KHz
- **Supply voltage:** 3.5 to 6.5
- **Dimensions:** 29.3x 24.4x16.4mm
- **Weight:** 12g

FEATURES

TRIMS AND SWITCHES. Not surprisingly, a high-end radio such as the Helios has trim buttons for all three channels, and you can reverse servo direction at the transmitter. A nice design feature is that you can assign toggle-style switches and normal pushbuttons to just about any function so you can customize the Helios to your liking.

ENDPOINTS (steering balance, throttle [brake], throttle [high point] and third channel). Allows you to set servo travel independently in each direction.

STEERING SPEED WITH TWO-WAY SETTING. This setting normally slows the transit time over the entire range by a fixed percentage. KO has taken this one step further by allowing users to define another point in the steering range and set the speed to another setting. For example, you can set the first 30 percent of steering throw to move the servo at 70-percent speed and the next 70 percent of servo throw to move at 100-percent speed.

THROTTLE SPEED WITH THREE-WAY SETTING. Again, this setting is usually for the throttle's entire range, and it allows users to actually set two-way points to divide the throttle's range into three parts. This allows users to give the throttle three distinct feels as it moves through the speed adjustment range. This could be helpful on slippery tracks or for drivers who are a bit choppy on the throttle.

STEERING AND THROTTLE/BRAKE CURVE. This is the exponential adjustment. Depending on the value you set, expo can make the servo more or less responsive around neutral.

ABS WITH ADJUSTABLE WIDTH, POSITION, CYCLE, DELAY AND DUTY. We all know that "ABS" stands for anti-lock brakes. "Width" is the amount of travel the servo gives each brake pulse; "position" is the point in the brake's travel on the transmitter at which the ABS function kicks in; "cycle" is how quickly the servo pulses within the "width" setting; "delay" is the number of milliseconds you need to wait when the trigger reaches the "position" setting before ABS kicks in.

THROTTLE PRESET. This function allows you to set a button to move the throttle servo to a preset position. This comes in handy if you like to start your nitro cars at a ¼ throttle or you have to hold the brake while starting. When you release the button, the servo returns to neutral.

STEERING/THROTTLE PUNCH. This feature lets you program the throttle or steering to instantly deliver a preset (set by you) range of travel as soon as the transmitter trigger or steering wheel moves out of neutral. This is a good setting to use to compensate for linkage play in nitro cars. You can also use it to make stock motors feel more "punchy" or to make your steering feel more responsive without messing with the "curve" setting.

THROTTLE ACCELERATION WITH ADJUSTABLE WIDTH, POSITION LOW, POSITION HIGH AND CYCLE. Consider this the traction-control setting. "Width" is the amount of servo travel each pulse has; "position low" is the point in the trigger throw at which this feature kicks in; "position high" is the point in the trigger throw at which this feature shuts off; and "cycle" is the speed at which the servo pulses the width setting.

STEERING TRAVEL. On other radios, this is called the "dual-rate" function. It allows you to set the steering's overall travel within the radio. The setting ranges from 0 to 150 percent. Typically, this is left at 100 percent and can be increased or decreased on the fly by assigning a trim switch to this function.

THROTTLE/BRAKE. Think of this as dual rate for the throttle/brake servo, but you can set brake and throttle throw independently. It's similar to endpoints because you can't set the brake to provide more travel than the endpoint setting—only an equal amount or less. A 100-percent brake setting may only be 38 percent of the actual servo travel in that direction.

SUBTRIM (steering, throttle/brake and third channel). Subtrim is an auxiliary trim function that allows you to center the servos without having to use the main trim functions. This leaves the full range of trim movement for the main trim functions.

ASSIGNABLE SWITCHES. You can customize the Helios by reassigning the functions of the grip and wheel switches. For example, the "BT1" button by the thumb of the throttle hand is perfect for counting laps and for the throttle preset function.

LIKES

- Ergonomic design is very comfortable for drivers with large hands.
- Feature filled. This radio offers a ton of adjustability.
- Jog dial allows for easy access to all menus.
- Super-compact receiver.

DISLIKES

- Some settings may be a bit confusing for novices.

FEATURES

AUTO START WITH ADJUSTABLE PRESET AND THROTTLE POSITIONS. This function allows users to set a particular throttle position for the servo when a predetermined trigger position is reached. When the trigger movement starts back towards neutral, this function shuts off, and the throttle goes back to normal operation.

9-MODEL MEMORY. The question is—do you have nine cars? Even if you have only one, this function is handy because you can save different setups for your car. You can name each model or setup using 10 characters and special symbols such as plus signs, dashes, quotes, etc.

DIGITAL VOLTAGE DISPLAY WITH AUDIBLE LOW-VOLTAGE WARNING. Keep an eye on those transmitter batteries!

NORMAL AND HSR MODES, "2CH/3CH MODE." Out of the box, the Helios transmits using "HSR" (High Speed Response) for fast-frame-rate operation with digital servos. You can also switch it to "normal" mode; think of this as regular FM, if you want to use analog servos. You can also turn off the third channel to further speed response time. The Helios is shipped in "2ch HSR" mode—its fastest mode—direct from the factory.

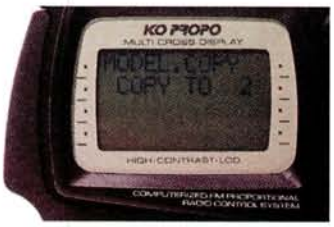
TIMER WITH COUNTDOWN, COUNT-UP AND LAP-TIMING FUNCTIONS. This is pretty self-explanatory. The lap timer is the key function. You can set it to start as soon as you squeeze the throttle trigger and hit a user-programmable switch to click off each lap. Up to 80 laps can be saved and played back. It also has programmable alarms that beep when a certain time has elapsed, a 3-second lockout to prevent double counts and a pre-alarm countdown to warn you when you're within a programmable number of seconds to the main elapsed-time alarm setting.

CUSTOMIZABLE MENUS. You can customize several sets of menus for use with different models. This means that you can hide the functions you never use and pare down your visible choices to the necessary ones. This is a great feature, as the number of functions increases with every new radio released. See "Break out the laptop" for more info on the software available to complement this radio.

ALERT TONES. This radio's audible warning tones are very well thought out. When the following happens, a distinct sound tells you when you've reached the end of a trim's range, the end of the dual-rate range, and the center of the trim range, or that the countdown timers are expiring. The "radio-on" reminder beeps after a user-programmed number of minutes pass with no input to the radio You can also program your own custom tones/songs using downloadable software from KO.

WARNING LIGHTS. KO was smart enough to know that some of the settings on its radio are very complex and can cause those who set them and then forget them many headaches. To avoid this, KO placed warning lights over the steering wheel to warn drivers when the ABS, throttle speed and throttle acceleration have been set. I like this feature a lot!

MODEL COPY. This function allows you to "paste" settings from one model into another. This is great if you want to experiment with changes to your favorite setup. You can make changes to the copy and know that your original is safe in the Helios' memory.



HSR MODE. The Helios is sold with the KR-302 micro-receiver with the circuitry. In HSR mode, the Helios transmits at a faster frame rate. Combined with the HSR receiver, the faster frame rate increases signal response and clarity and servo precision. The only catch is you must use digital servos; non-digital servos can be damaged in this mode. The Helios will work with older receivers such as the KR-297 and the KR-301F. If you use the KR-297FZ, you will need to switch the radio to normal mode. And when using the KR-301F, you can use normal mode or 3-channel HSR mode. The addition of the third channel to the signal takes enough bandwidth away to make it safe for analog servos.

KO's "jog dial" allows you to access all of the radio's menus very easily. Or you could just pretend you're a DJ and spin some "KO vinyl."

TESTING

When you unpack the radio, you'll immediately be struck by how tiny its receiver is. This has to be one of the smallest receivers on the market, and it will easily fit into any car. I first tested this radio in an electric sedan running indoors at the local carpet track. I used a KO PDS-4323FET steering servo and a KO speed control. Like all indoor tracks, this one has its share of radio "issues," but during two weeks of racing with the Helios, I had no problem with interference. To further test the receiver, I played with the frequencies in my speed control to see whether I'd be able to generate enough RF noise to cause a problem, but I couldn't. This is a solid receiver.

For the second round of tests, I installed the KR-302F receiver in my nitro sedan and played with all the functions. All functions worked as described but were somewhat confusing to set for the first time (including the ABS function and throttle preset). The most puzzling function was the "Auto start" function. Though it works as advertised, in my opinion, the preset throttle position in this function doesn't operate properly. I think this because it will allow you to set a throttle position preset that is outside the throttle: high-point setting. Setting this value to 50 percent doesn't move the servo to 50 percent of the "throttle: high-point" limit; it actually moves the servo 50 percent of its total available travel. Not intuitive and not right, in my opinion, but it's easy enough to work around if you want to use this feature.

In the end, what I liked most about the radio was the easy-to-use jog dial wheel that allows you to go through the menus to find the function you need, and when you find it, it makes changing the values a snap. The menu interface as a whole is very intuitive and easy to understand even without reading the instructions. I also installed the multi-angle drop-wheel conversion; I found it very comfortable; it gives a more natural feeling than the standard wheel position. Out of the box, the wheel mechanism feels a bit heavy for my liking, but its adjustable spring tension allowed me to lighten it.

GET YOUR TILT ON

KO's multi-angle drop-wheel conversion for the Helios (item no. 17004) is a pretty simple add-on that almost anyone with minimal mechanical skills can add to the radio. It allows the driver to tilt the steering column wheel at an angle that will keep his wrists in line with his forearms. This cuts down on driver fatigue in long nitro Mains and is ultimately a more natural position for the wrists.

KO Propo's multi-angle drop-wheel conversion lowers the position of the steering wheel and allows you to tilt the wheel at an angle so you can hold the radio more comfortably.

The Helios' digital trim buttons can be assigned different functions. This ET3 lever comes assigned from the factory to handle the throttle brake trim.

Two additional trim levers (ET4 and ET5) are located under the wheel next to the trigger. ET4 handles steering travel and ET5 is unassigned. Directly underneath them is the BT1 switch, which is commonly used to activate the lap timer.

BREAK OUT THE LAPTOP

KO Propo offers an optional laptop interface (item no. 61001) to manage the Helios' settings. The package comes with a serial cable to connect the radio to the laptop and software. The software gives users a nice graphical interface to adjust all the function values and to make custom menu sets that limit the functions you see in the menu and the order in which they are displayed. This computer interface also allows users to compose their own custom tones with a graphical interface that looks as if they're writing music. KO even offers downloadable custom tones that its customers have submitted. I'm waiting for "Bad to the Bone" to be posted.

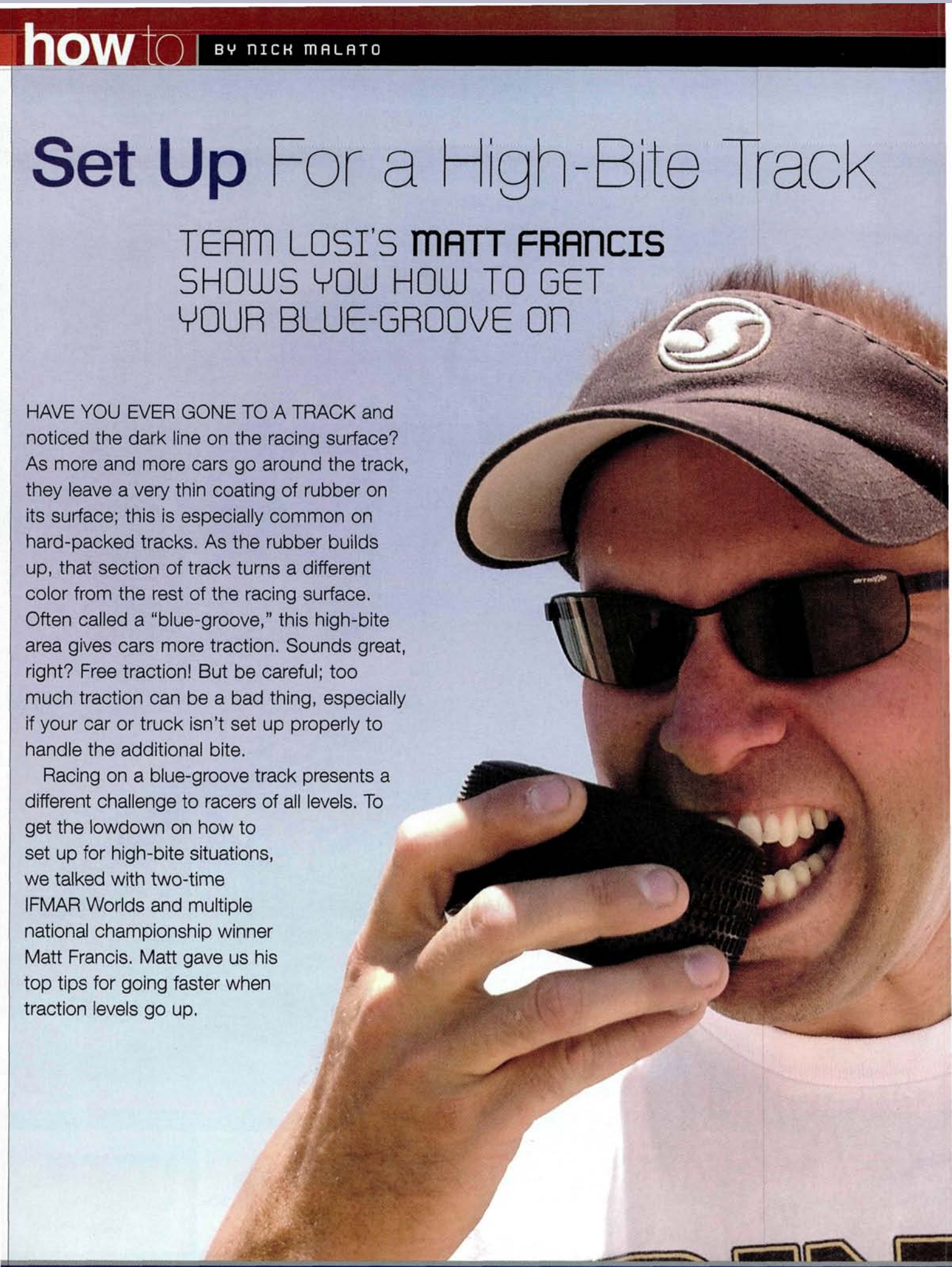
THE VERDICT

As you might have guessed, I like this radio. It's certainly not cheap, but it's priced on par with other high-end offerings from other manufacturers. It has more features than 99 percent of what racers need, but the functions that are important are there and work great. Some of the other functions such as ABS and throttle acceleration could be helpful to those who want to take the time to learn how to use them. The electronics are very solid, and the size of the receiver makes it a fit for just about any car. If you are looking for a "racer's" radio with no compromises, look no further. ■

FIND IT
>>> Go to page 250 for manufacturers' contact information

Set Up For a High-Bite Track

TEAM LOSI'S **MATT FRANCIS** SHOWS YOU HOW TO GET YOUR BLUE-GROOVE ON



HAVE YOU EVER GONE TO A TRACK and noticed the dark line on the racing surface? As more and more cars go around the track, they leave a very thin coating of rubber on its surface; this is especially common on hard-packed tracks. As the rubber builds up, that section of track turns a different color from the rest of the racing surface. Often called a "blue-groove," this high-bite area gives cars more traction. Sounds great, right? Free traction! But be careful; too much traction can be a bad thing, especially if your car or truck isn't set up properly to handle the additional bite.

Racing on a blue-groove track presents a different challenge to racers of all levels. To get the lowdown on how to set up for high-bite situations, we talked with two-time IFMAR Worlds and multiple national championship winner Matt Francis. Matt gave us his top tips for going faster when traction levels go up.

STICK WITH YOUR BASIC SETUP

When racing on a new high-bite track for the first time, Matt suggests that you start with the same basic setup as you would normally use. Knowing what your car can do and being comfortable with it can sometimes be the biggest advantage. As you start running and get used to the track's conditions, you'll be able to tell in which direction you need to go with your settings. Matt tells us that it's very important to make sure that you learn the track layout before you begin to modify the car's settings; consistent driving will get you a faster lap time than any pair of springs you can put on your car.

MATT SAYS "Hitting the track with a well-maintained car is the key to success."

Be sure all the parts on your car are working correctly and that nothing is binding, bent, or broken. You can make all the tuning changes in the world, but if your car hasn't been properly maintained, you can't get the maximum performance from it.

TIRE SELECTION

Before you change anything on the chassis, make sure that you have the right tires. Every pro racer will tell you that choosing the proper tire is the most important factor when it comes to tuning your car or truck.

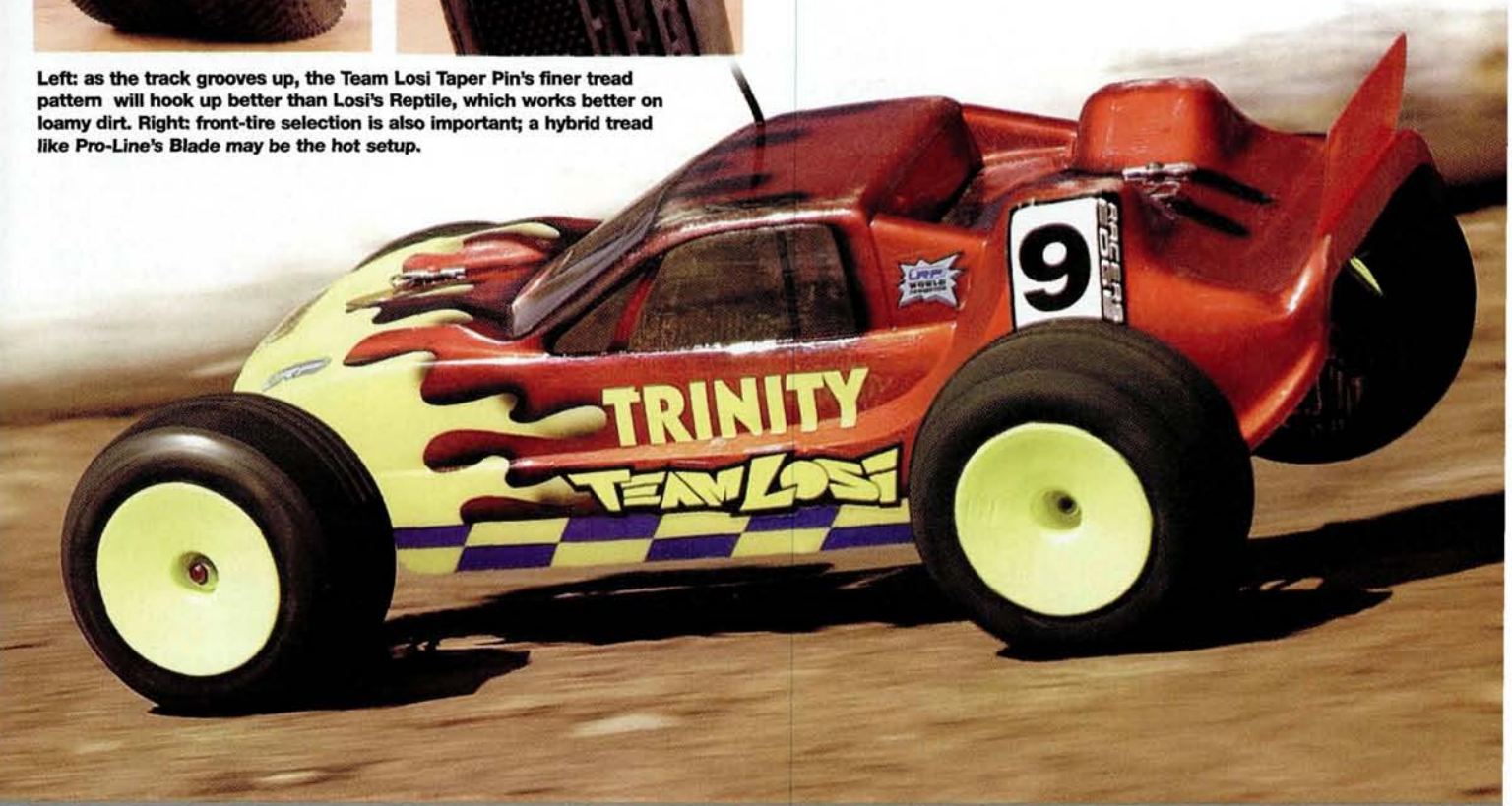
MATT SAYS "Tires play the biggest role in getting your car around the track fast."

Pin pattern. As the groove starts to come up on the track, you need to run a tire that has a tighter pin pattern. This helps put more surface rubber in contact with the track. More rubber equals more traction.

Left: as the track grooves up, the Team Losi Taper Pin's finer tread pattern will hook up better than Losi's Reptile, which works better on loamy dirt. Right: front-tire selection is also important; a hybrid tread like Pro-Line's Blade may be the hot setup.

Compound. A softer tire compound will also give you more traction, but you have to be careful that you don't pick too soft a compound. Picking the softest, stickiest tire can sometimes backfire and give you way too much traction. For example, have you ever seen a car flip at the end of the straightaway as it makes a turn? More than likely, that racer chose a tire that was too soft. Instead of being able to turn properly, he simply traction-rolled while trying to set up for the turn. Unfortunately, this is an area in which we can't give you specific tire information; you'll have to experiment because track conditions can change drastically. Ask around in the pits to see which type of tire and compound everyone else runs; use that as a starting point, and experiment from there.

Inserts. Normally, you would also change to a firmer insert so the tire has less flex; this allows it to keep that all-important contact patch with the track. You have to be careful here, too; if the track becomes very rough, a softer insert will be a little more forgiving. Remember; everything with the setup is a compromise, and you have to decide which is a bigger problem: too much traction or instability over bumps. At the ROAR Off-Road Nationals this year, Matt said he used a softer insert than usual because the track was so rough.



TUNE FOR THE TRACK

If you find that you need to make changes to your setup, here are some of the basic changes and how they will affect your car's handling.

Springs. Springs control the roll, balance, ride height and jumping ability of your off-road car. Stiff springs react more quickly, and soft springs react more slowly. On high-bite tracks, racers often use a combination of stiffer springs and heavier shock fluid (see below). The additional traction puts more force on the tires and chassis, so to compensate, you have to set up your suspension a little more stiff than usual.

Shock fluid. Heavier fluid will make the car react slowly and thinner fluid makes the car react faster. Slightly thick fluid is usually needed when running on high-traction surfaces. Just remember: your suspension has to not only react to the additional traction but also has to work well on jumps and bumps, so don't set it up too stiff!

If you're serious about setup, add a set of tuning springs and a seleciton of shock fluid to your gear bag.

Camber. Camber links adjust the camber angle of your tire. Generally, more negative camber makes your car feel softer, while less camber makes your car feel stiffer. You don't want to go too far with camber settings, though; when adjusting camber, only change it a degree or two at a time, and test its effect.

Battery placement. Moving the battery forward or backward will adjust the weight distribution. Moving it back provides more traction by moving the weight toward the rear. Moving it forward increases steering because it takes weight off the rear and moves it toward the front.

Wheelbase. A longer wheelbase makes your car harder to turn. This can be used if you feel your car has too much steering or if it seems very sensitive to changes of direction. Wheelies look cool, but to get the front end back down, you have to let off the gas, and that means you aren't going as fast as you could be.

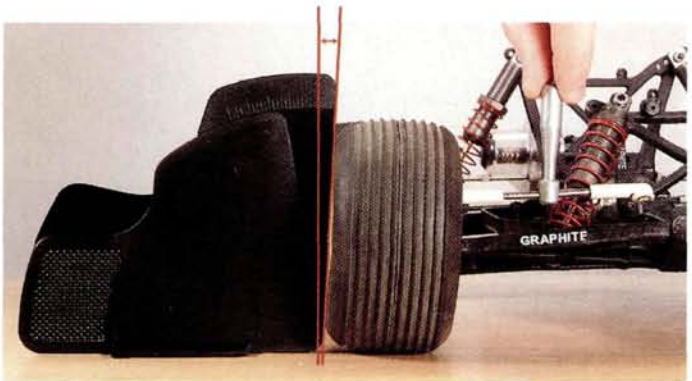
Battery placement isn't rocket science: forward for more steering and rearward for more traction.

MATT SAYS

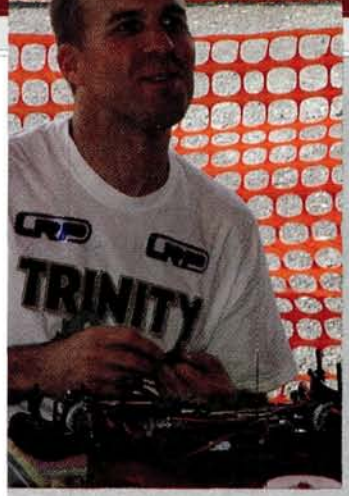
"On high-bite, off-road tracks where wheelies are common, I run a longer wheelbase to help 'spread' out the weight of the car to smooth the way it drives."

Wings. On high-bite conditions, use a little more rear wing. Many drivers now use a wicker on the wing that can easily be adjusted trackside.

Tuning for high-bite tracks can be difficult at times because track conditions change rapidly as more cars run on it. Most racers get a dialed-in setup only after they've spent considerable time testing and tweaking. Use Matt's tips to improve your skills on high-bite tracks, and maybe you'll meet up with him in the victory lane.



If the tire leans in, the camber setting is "negative." If it leans out, the setting is "positive." Caster is usually set between zero degree (vertical) and 3 degrees negative. One or 2 degrees is typical.



Matt's High-Bite Tips for Touring Cars

Although most of Matt's focus for this article was on setting up for high-bite off-road tracks, many of his tips work for touring cars as well. But a few issues are unique to running a touring car on high-bite tracks.

››› When running on carpet with very high traction, Matt recommends that you put a ring of glue around the outer edge of the tires to prevent them from snagging on the carpet, which could make the car traction roll. Also, with foam tires, a low tire diameter will help prevent traction rolls because the center of gravity is lower.

››› Look for ways not only to lower your car's weight, but also to keep that weight centered. This helps keep chassis roll to a minimum. If the chassis rolls too much, either the front or rear of the car can lose traction, and we all know what happens then!

››› Body choice can make a big difference in the way your car handles. Most people will look at two bodies and see only the style; Pro drivers see precious tenths of a second. Some bodies provide more steering and some make the car more stable. The key is to experiment and try a few different styles to see which works for your car and your driving style.

FIND IT

››› Go to page 250 for manufacturers' contact information

Install a Shaft-Starter

GET FIRED UP FAST!

THE CONTINUOUS CRANKING OF A SHAFT-STARTER makes a nitro engine easier to fire up. Vigorously yanking a pull-starter can't match the positive effect of a slow but steady cranking of an engine, especially one that has a fuel mixture issue. The steady action of the shaft-starter helps draw fuel into the engine, and assuming everything else needed for combustion is present, the engines just fire up a lot easier.

A new crop of remote shaft-starters such as the HPI Roto-Start, OFNA Shaft Start and Trinity Smart Start offer the convenience of a power starter and the benefit of being able to leave all the heavy gear back in the pits once the engine has been started. These starters first appeared on RTR vehicles, but now, there are kits available to convert engines equipped with onboard electric starters or pull-starters to use a shaft-starter.

YOU'LL NEED

- Small Phillips-head screwdriver
- Small flat-head screwdriver
- Hex wrench (2.0 to 2.5mm, depending on the engine)
- Spray solvent for engine and parts cleaning

Rotary starting kits are available from a number of manufacturers to fit a variety of engines. This one from HPI is a complete starting kit that includes a backplate and hand-held starter.

INSTALLING A SHAFT-STARTER

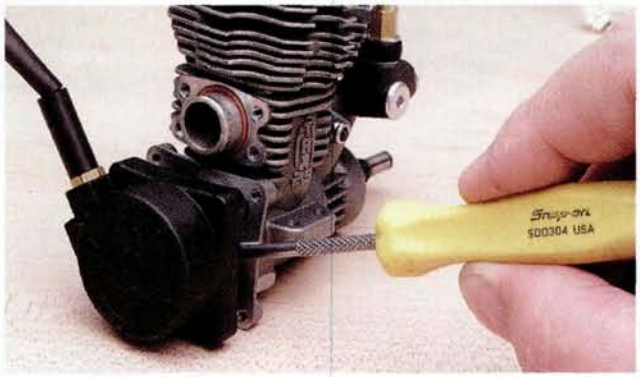
1 If you plan to install a new starter on a used mill, clean the engine first. Working on a greasy, slimy engine is nasty, and you don't want to get grit and grime into the one-way bearing. Plug up all the openings in the engine, and use a little denatured alcohol or nitro cleaner to clean the engine in a well-ventilated area away from any heat source or open flame.

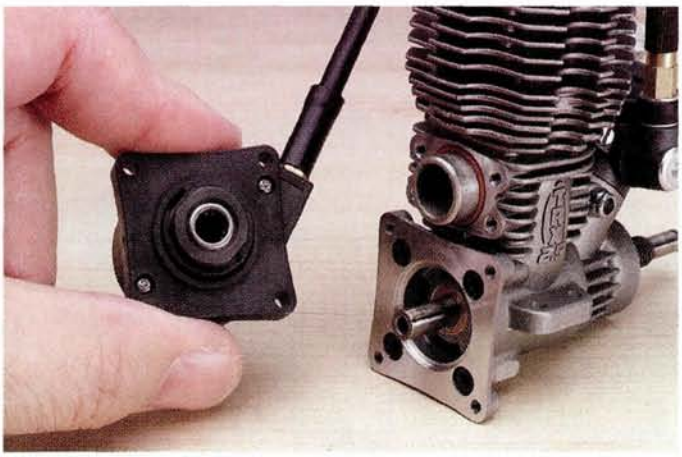
What is a shaft- starter?

A standard 540 motor, similar to those that power electric RTR cars and smaller trucks, is fitted inside the housing of the hand-held starter unit. The motor is connected to a standard 6-cell battery pack; a momentary switch delivers the juice to the motor, and that drives the starter shaft. The starter shaft is basically a really long dogbone driveshaft that fits into the hand-held unit on one end, and its other end fits into a drive cup in the backplate mounted on the back of the engine. The backplate, like the hand-held unit, has a gear reduction to make it easier for the starter motor to crank over the engine. The shaft-starter evolved from the pull-starter; some of its components were carried over to adapt a more effective starter to newer engines. It's a more attractive alternative because it's more user-friendly and the vehicle doesn't have to carry the weight of the entire starter assembly once the engine has been fired up.

2 Remove the screws that fasten the original starter to the back of the engine, but don't pull it off yet. The shaft-starter kit shouldn't need to reuse the screws that held the original starter, but avoid damaging or losing them because you may want to keep them as spares.

3 Electric starters like the Traxxas EZ Start and EZ Start 2 come right off the engine once the screws have been removed. A pull-starter, however, should be removed more carefully if you want to save it for future use or to keep it as a backup. Make sure that the spool that houses the starter cord and the recoil spring isn't pulled out of the starter housing as you separate the housing from the engine. Often, this causes the recoil spring to become detached or to uncoil violently. Then you you might as well pitch the pull-starter because rewinding the spring is as annoying as trying to solve a Rubik's Cube. Insert a small, flat-head screwdriver between the starter housing and the starter shaft, and use it to pull the entire starter assembly off.





4 Remove the one-way bearing from the old starter assembly. Many shaft-starters don't include a one-way bearing; they require that you use the one that came with the engine.

5 Clean the one-way bearing and starter shaft, and when they're both dry, use light oil such as 3-in-1 or bearing oil to re-lube them.

Sullivan Tiger Drive

The Sullivan Tiger drive is another alternative to pull-starters and on-board electric starter. The Tiger Drive can be attached to the backplates of most pull-start engines and those with electric starters. The Tiger Drive is designed to use a handheld starter (typically used to start airplane engines) or a good cordless drill. Sullivan makes a "starter probe," (a long 7/32 ball-driver hex wrench and an adapter) to attach it to the starter shaft hand-held starters. Hand-held starters are the best option because they are strong and crank the engine at pretty high rpm. Typically, Sullivan starters crank out between 5,000 and 9,000rpm; once passed through the 1.5:1 gear reduction of the Tiger Drive, the engine should be cranking at a few thousand rpm even under load. When using a high-voltage cordless drill, the gear reduction might cut the speed down to around 1,200rpm, but that's enough to start the engine.

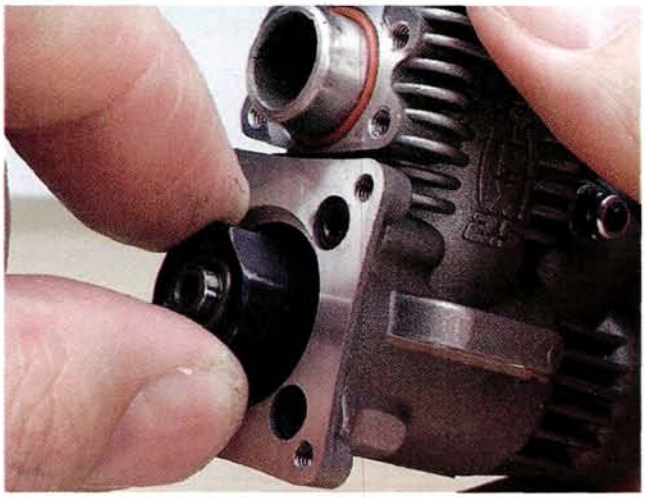
The Sullivan Tiger Drive easily converts most engines for use with a shaft-starter.

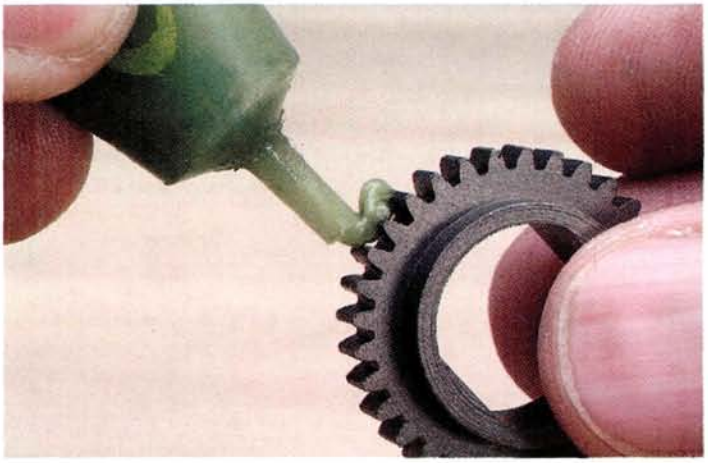
A unique aspect of the Tiger Drive is that it's a right-angle drive, so the starter shaft is inserted at a 90-degree angle. This creates a few mounting options because the input can be vertical to start from the top, facing either side of the engine, or even facing downward to start the engine from underneath.

Should I use a drill to start my engine?

Most companies offer the backplate kit separate from the hand-held starter unit, and that leads to the question, "Do I really need the hand-held unit?" Most of us have a cordless drill lying around the house, so it would make sense to press it into service and save the dough you would have spent on the handheld unit. Here's what to look out for: the portion of the starting system that is attached to the engine has a gear reduction. In the one I pulled apart, it has a reduction of 2.91:1. So a drill that spins at 800rpm will only crank the engine at about 275rpm. Given that nitro engines idle at about 6,000 to 7,000rpm, such a slow cranking speed will make starting more challenging. Try to use a 2-speed cordless drill. A high-voltage cordless drill at a high-speed setting produces more rpm, and that will make it easier to start the engine. Simply chuck up the starter shaft (you'll have to buy that separately); put the business end of it into the drive cup in the backplate, and then pull then trigger. The drill should be spinning counterclockwise (reverse) to get the engine started. It will be obvious if the drill is spinning the wrong way because the engine won't be cranking even though the drill is. Just be sure to stop cranking if the engine locks up. There's usually a good reason for the engine to suddenly lock up, and if you aren't careful, the massive torque of a drill can make a salad out of your engine's internals.

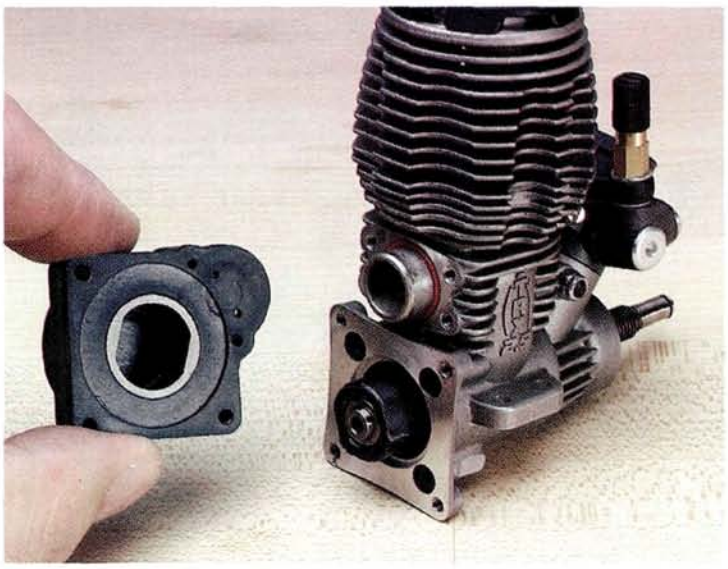
6 Reinstall the one-way bearing on the starter shaft that sticks out of the back of the engine. Make sure that the one-way locks and turns the engine over when you spin it clockwise. Conversely, the one-way bearing should spin freely when turned counterclockwise; this indicates that the bearing has been installed properly. If the one-way locks when spun counterclockwise, remove it from the shaft and install the other end of the bearing first.





7 Apply a little grease to the gears inside the backplate housing. This will make the starter work more smoothly and efficiently, so instead of fighting friction between the gears, it has more power on tap.

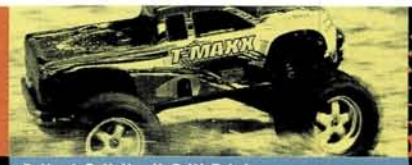
8 Slide the shaft-starter backplate over the one-way bearing; then attach the assembly to the engine with the included mounting screws. Some backplates may have to be attached in two stages; it depends on the model.



STARTING YOUR ENGINE

Once the shaft-starter has been installed, the worst part is over, and you're a few seconds away from firing up the engine. Use the following sequence, and your engine will fire up more quickly than ever:

1. Turn on the radio transmitter and receiver. Make sure that everything is working properly.
2. Plug the exhaust with a free finger, and crank the engine until you see the fuel travel through the fuel line to the carb. Stop cranking as soon as the fuel reaches the carb; if you don't, the engine may be seriously damaged.
3. Attach a charged glow starter, and then crank the engine.
4. Once the engine fires, remove the starter shaft from the engine, and you're ready to go! ■



BY JOHN HOWELL

Project Duner-Maxx

Have you ever seen any of those extreme videos that show crazy dirt bikers and quad guys tearing it up on massive sand dunes? Looks like fun, doesn't it? Well, I've been an avid dune rider for years, and I want to break out my RC rigs every time I go out there. For some odd reason, though, I've never built an RC car or truck that could handle that sort of soft-sand action. With that and an upcoming trip back to the dunes in mind, I decided to make a full-on, purpose-built "Duner-Maxx" for this month's column. I used the Stadium Maxx I reviewed in the December 2004 edition of "Maxx-O" as the starting point.

PARTS LIST

PRO-LINE
- Velocity 6 Weld Wheel (½-inch offset)–2662-01; $17
- Maxx Paddle (2 pr.)–1084-00; $25/pr.
- Maxx Ultra Firm foams (2 pr.)–6199-00; $8/pr.
- Streamliner Rig–3180-00; $27
- Bumper set–6018-00; $14
- ⅛ Molded wing–6024-04; $13

FANTOM
- FR .18 Maxx engine– FAN01024; $150/$160

MOTOR SAVER
- Air filter–272248; $15

1 TEAR IT DOWN

To get the S-Maxx ready for sand slinging, I completely disassembled the truck. When I had the transmission and rear diff out, I tore them apart and cleaned off all the gears and the inside of the cases (I wanted to get rid of any traces of stock lube). My goal was to run all the gears completely dry. I know that the gears will now wear out prematurely, but there was a method to my madness. If the fine silt from the sand were to find its way into the gearbox or diffs and mix with the lube, the gears would wear out twice as fast! If you plan to build your own duner, just be prepared to replace gears more often than you typically would.

When the gears were clean and ready to be reinstalled, I took the tranny and diff case and applied an ultra-thin coating of thick molybdenum lube to the inside of the cases. If dirt did get inside, my hopes were that it would get trapped by the sticky grease and stay away from the gears. For extra protection, I also ran a small bead of silicone sealant around all the seams of the tranny and diff housing. Trust me: take preventive measures to deal with the sand! You don't want any dirt to enter your drivetrain.

PHOTOS BY DERON NEBLETT

2 PICK YOUR PADDLES

Obviously, I needed paddles for the truck, so I turned to my pals at Pro-Line to hook me up with a couple of pairs of its Maxx Paddle tires. I also grabbed a set of firm foams to go inside them; with dune tires, you want the carcass to stay rigid so you get good forward bite. I asked them for two sets so I could make some realistic-looking "smoothies" for the front (see Step 4 "Making a Smoothie"). If you want to turn your 4WD T-Maxx into a similar dune machine, just bolt on two sets of paddles. I would highly recommend that you build up some dirt shields out of Lexan sheets, though, to prevent more sand from entering the chassis area.

The backbone of the project was Pro-Line's Maxx Paddle tire. A couple of these can kick up quite a bit of roost!

I mounted the tires to Pro-Line's Velocity 6 Weld Wheel (with a ½-inch offset to add a little more width to the overall package).

With its smooth tires in the front and paddles in the rear, my Duner Maxx was all set to take on the soft sand.

3 PACK IN THE POWER

I had run the stock TRX 2.5 engine into the ground, so I decided it was time for a swap. I didn't want to go big-block, though; it would have been overkill in this 2WD truck. Instead, I installed a Fantom FR .18 engine. This little 3-port drop-in engine puts out decent power, and it's pretty easy on the wallet, too (it has a street price of around $150 to $160). It comes with a 2-needle carb, a knife-edge conrod, and it readily accepts the Traxxas clutch, pull-starter, or EZ-Start 2. Since I was going to run this truck through so much fine sand, I ditched the stock EZ-Start setup and bolted on a pull-starter. (I had a feeling that the electric motor in the EZ-Start wouldn't gel too well with all the "silty" stuff). While I was at it, I replaced the stock air filter with one from Motor Saver Filters. Motor Saver's big claim to fame is that its filter is designed specifically to filter out very fine, powdery dirt. It has a screen filter (with cap) that houses a foam filter. If you want even more protection,there is also enough room on the Maxx for you to run Motor Saver's ⅛-scale outer foam element.

A "drop-in" Fantom Racing FR-18 engine powers the truck. A Motor Saver filter helps keep all that fine silt from getting into the carb.

4 MAKING A SMOOTHIE

Since the S-Maxx is a 2WD truck, there isn't any reason to run paddle tires up front. I wanted to create more realistic-looking tires, so I decided to make my own dune "smoothies"—bald tires that a lot of sand dune quads and dune buggies run up front. I started by taking a set of Pro-Line paddle tires, and I carefully clipped off all the paddles as close to the tire carcass as possible, so I wouldn't have to shave off too much material afterwards. I then mounted the tires on the rims and carefully sanded them on a belt sander so I would get a nice, even "scrubbed" finish. I was careful not to go too far; you don't want to go too crazy with the sander and puncture the tire carcass.

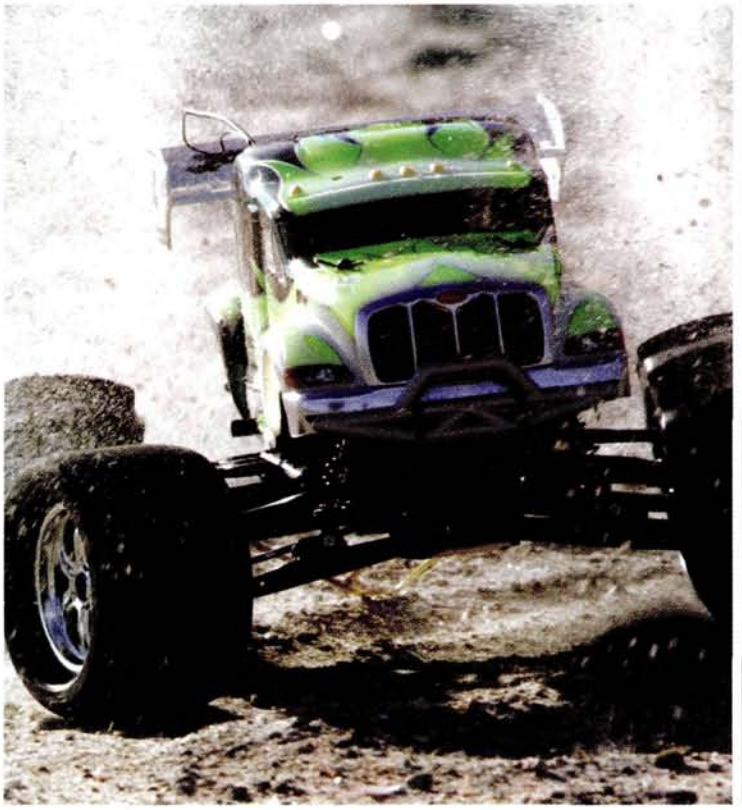
If you don't have access to a belt sander, you can smooth the tires out with a Dremel tool fitted with a sanding wheel (although the finish won't look as uniform). Or, you could just clip off the paddles and leave it looking like a funky grooved tire.

I took a set of Pro-Line Paddles, clipped off all the paddles and then hit them on a belt sander to smooth off the grooves. The finished smoothie looks just like the real deal!

5 BOLT-ON BLING

I wanted to dress up the truck a little, so I added a set of Pro-Line front and rear bumpers and topped it off with one of Pro-Line's new Streamliner bodies. I also added one of Pro-Line's ⅛-scale buggy wings. Bill Zegers of Zegers R/C Graffixx created the wild paint scheme for me. It looks pretty mean!

Check out the awesome paint job that Bill Zegers laid down on Pro-Line's Streamliner body. The rear wing prevented the truck from flipping over after it found traction.



SAND SESSION

With my trip to the dunes still a few weeks off, I decided to do a fast pass at the nearby beach to see how my Duner-Maxx worked. The sand consistency is very similar to desert dunes, but it's a little more corrosive thanks to the nearby salt water. With that in mind, I knew I would have to thoroughly clean the truck afterwards.

Since the Fantom engine was a transplant from another vehicle, it was ready to rip. I fueled it with 20-percent Trinity Platinum fuel and fired it up. The truck pulls massive wheelies; the Fantom FR .18 provides really good low-end grunt and respectable top speed. The S-Maxx doesn't steer quite as sure-footedly as it once did (thanks to the smoothies), but I wanted it to look like the real deal. I was able to find a few interesting divots in the sand and used them as small jumps. My Duner still jumps like a Maxx!

I've saved the most important thing for last—the roost. It's so much fun to watch the truck launch off the line while spraying sand into the air. I got more of a kick just taking off from a dead stop than anything else! I was able to get into some really soft, dry sand and kicked up roosts that were at least 3 feet tall. Talk about a total blast; the truck looked sick!

As soon as I get back from my trip to the dunes, I'll post a few pictures online. I plan to go big off those sand hills, so stay tuned! ■

FIND IT

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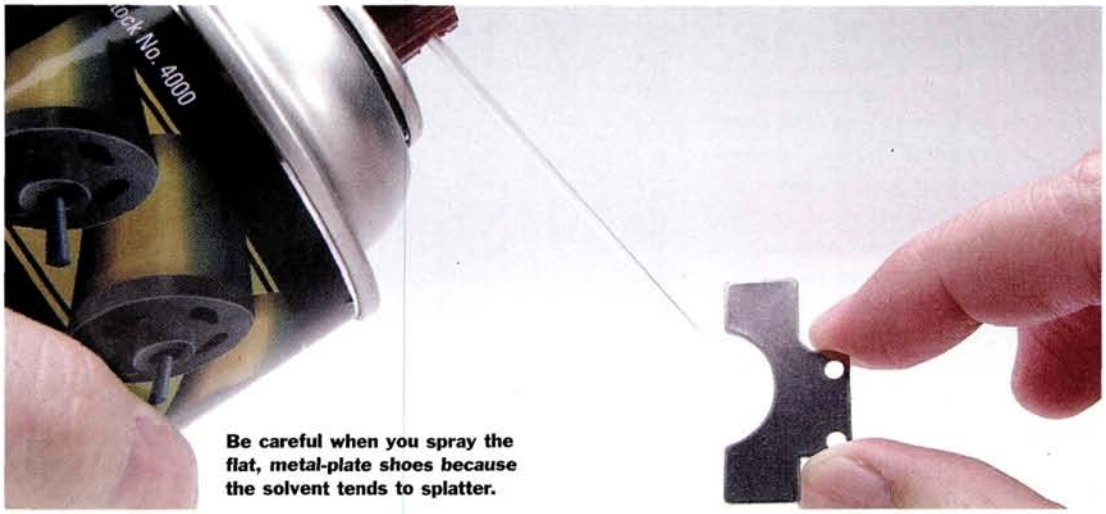
Building better brakes for your nitro rig

HAVING BIG HORSEPOWER AND GOING REALLY FAST ARE THE FIRST NEEDS OF A NITRO FANATIC. The excitement of laying down the ponies is just too important for many of us to be concerned about stopping at the other end of that full-speed blast down the straightaway or across the empty parking lot. Think about it: when did you ever see anyone get excited about how fast his car can stop? Right; that's what I thought. But even though it isn't high on our radar screens, good binders are essential and are extremely important for a racing machine. Good brakes are also money savers for bashers who want to avoid stuffing their rigs into cement pylons at the end of parking lots. The faster your rig goes, the more important its braking power is. If you have to assemble brakes for a kit vehicle or replace them in an RTR, follow these simple tips to ensure that your brakes do their job properly and consistently.

ASSEMBLING BRAKE PADS

1 Clean the metal brake shoes with solvent to remove any oil. The fiber brake pads are glued to the metal shoes, so you must clean the shoes to ensure that the brake pads will stick well.



Be careful when you spray the flat, metal-plate shoes because the solvent tends to splatter.

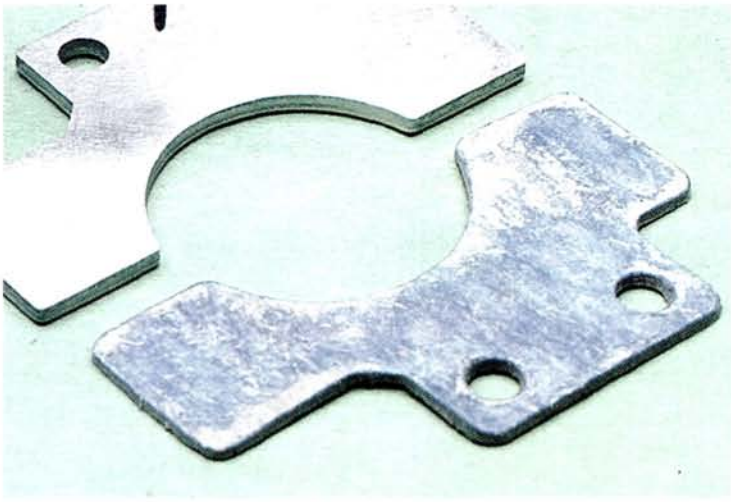
A piece of servo tape makes it much easier to sand the shoes.

The shoe on the right is "Before"; the one on the left is "After."

2 Use 300- to 400-grit sandpaper and a flat, clean surface to lay the metal brake shoes flat.

Sand the side of the shoe where the new pad will be attached. Scuffing the surface to which the pad will be glued gives it a little "tooth" and makes it easier for the glue to bond to it. Sand with a circular motion, and switch directions often. Use a piece of double-sided servo tape so you can push the part around on the sandpaper without too much trouble. Sand it until its entire surface is evenly scuffed

3 For a more secure bond, lightly scuff the side of the brake pad that will be glued to create a better bonding surface and also to get rid of any coating that's on the pad.



The shoe on the right is "Before"; the one on the left is "After."

4 Choose your adhesive well. The typical kit assembly instructions recommend that you use CA glue or "rubber" cement, but neither is heat-resistant, and braking produces heat because of friction. I've used CA for years and had very few problems, but I've grown to like J-B Weld epoxy for a couple of reasons: it's very heat-resistant (up to 600 degrees F), and once it has cured, it's insanely strong. Its only downside is that it takes a few hours to set.

Scuff the brake pad, too, and you'll get the best possible joint when you glue the parts.

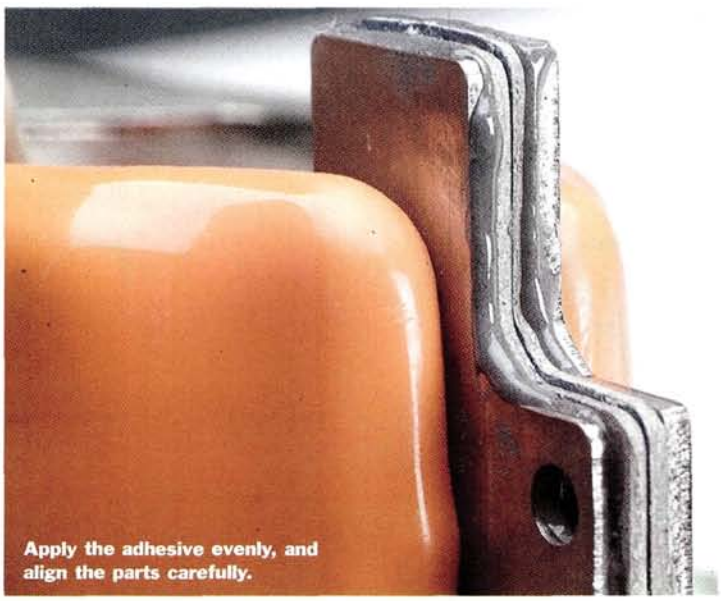
DO I NEED TO GLUE MY BRAKE PADS?

Some racers don't glue their brake pads. I've only had a few failures because I didn't use glue, so you can get away without doing it. Of course, it depends on how much pad material is around the alignment holes. My failures resulted from having torn brake pads because there hadn't been enough pad material around the alignment holes and the pads weren't glued to the shoes. I prefer to glue the brake pads on, but it isn't essential.

5 Glue the brake pad to the shoe. The epoxy's long setting time means that you have lots of time to align the two properly. Align the screw holes in the pad and the shoe. Screws or pins that affix the brakes will be installed in these holes, and it's most important that the assembled brake shoes are able to "float" freely on them.

Use CA if you're in a hurry, but if you can spare the time, use J-B Weld instead.

6 Lightly keep the brake shoe and pad clamped together while the epoxy sets; don't clamp them too tightly, or they may slip out of alignment. If the epoxy sets while they're misaligned, you'll have to start over with a new brake pad.



Apply the adhesive evenly, and align the parts carefully.

7 Wipe away excess epoxy before it sets. It's a lot easier to clean up when it's a liquid, but you don't need to get crazy—to the point at which you wipe away epoxy where you should leave it.

A spring clamp is perfect for holding the shoes and pads as they dry.

8 Clear the screw holes in the brake pads. I use a tapered stone bit to clear away the lining material from around the hole in the shoe. This helps the pads to move more freely on the screws or pins that hold them, and that, in turn, prevents them from binding.

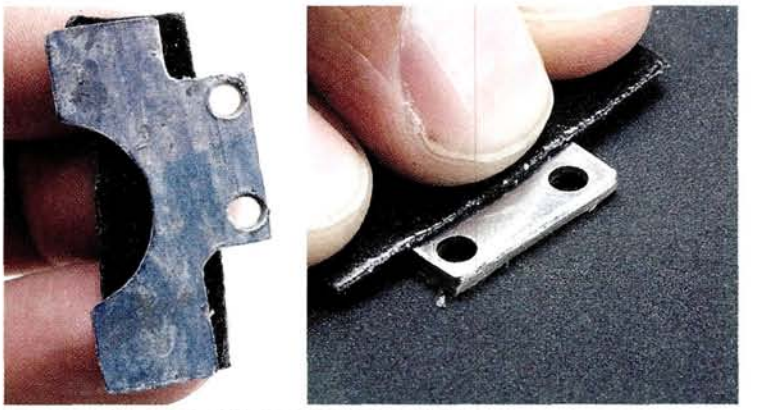
DO NOT SAND THE BRAKE DISKS!

Brake disks can be stamped out of metal or be surface-ground; the latter produces the flattest, most balanced brake disks for smooth, consistent and powerful braking. Stamped brake disks tend to have a slightly uneven surface, so there's a risk of hot spots and brake fade. As much as you might be twitching to try it, do not try to sand your brake disk flat. It's virtually impossible to sand it perfectly flat; hand-sanding guarantees that it will be thicker in some areas than in others. That will make the brakes pulse more than if you had just left the disks alone; it will amplify the problems you were trying to fix. Your best bet is to buy a precision-ground aftermarket disk, but if you don't want to spend the extra cash, just run with a stamped one.

9 Use a sanding drum to clear away excess brake-pad material from around the outside of the shoe. The extra metal isn't useful and may interfere with another part.

A tapered stone cleans out the screw holes nicely; just look at the before and after shots.

10 Use a piece of double-sided servo tape again and sand the brake lining down enough to break through the glaze, and sand the pad so it's nice and flat. Install your new brakes. You've finished!



One more trip to the sandpaper for perfect pads.

FIND IT

››› Go to page 250 for manufacturers' contact information.

TECH Q&A

? I read your article on porting the HPI S-25 engine, and I decided to do the same to my stock Savage S-25 engine. The engine now rocks, and it didn't cost a penny, so thank you for such a great article. I have a question related to it. I also have an RC10GT RTR with a stock engine, and I'd like to get a little more power out of it. Can I make some of the same mods to this engine? Will this work I be able to increase its power to the same degree? Andy K. [email]

A The tips on porting apply only to that particular engine. Sure, some of the work that you do on the outside of the sleeve will work on any engine, but the changes in port timing are absolutely specific to that engine. The response to that article has been so positive that I plan to write more of this type, so maybe I'll tweak the Associated .15. Nice to hear that your Savage now hauls ass. ■

No matter how skilled you are at painting, you won't get results like this without the right tools.

Tool time

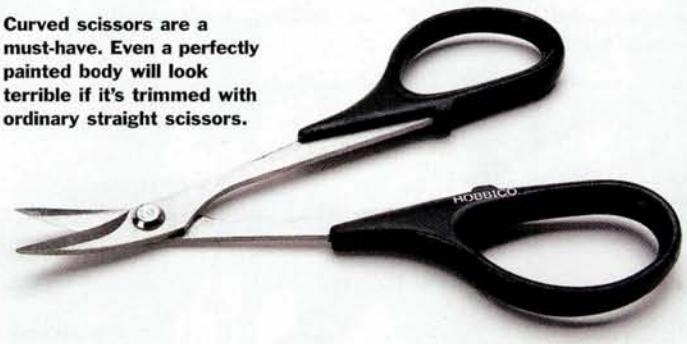
THE RIGHT TOOL CAN MAKE ANY JOB INFINITELY EASIER. Nowhere is this truer than when you paint and detail RC car bodies because clean and precise work is essential. That's why I always keep several specific tools and supplies at the ready. This month, I highlight some of my favorite tools and share some tricks to using them.

BODY REAMER

Using this tool is the easiest way to get clean, precise body-post mounting holes through your shell. It is also good for making holes for your tuned pipe stinger and for starting larger cutouts in the middle of a body such as cooling holes. Simply use the reamer to make small holes at each corner of the part of the body you wish to cut out, and then connect the holes using scissors or another tool.

Some reamers, this DuraTrax, for example, include caps to protect the sharp point—and your fingers!

Curved scissors are a must-have. Even a perfectly painted body will look terrible if it's trimmed with ordinary straight scissors.



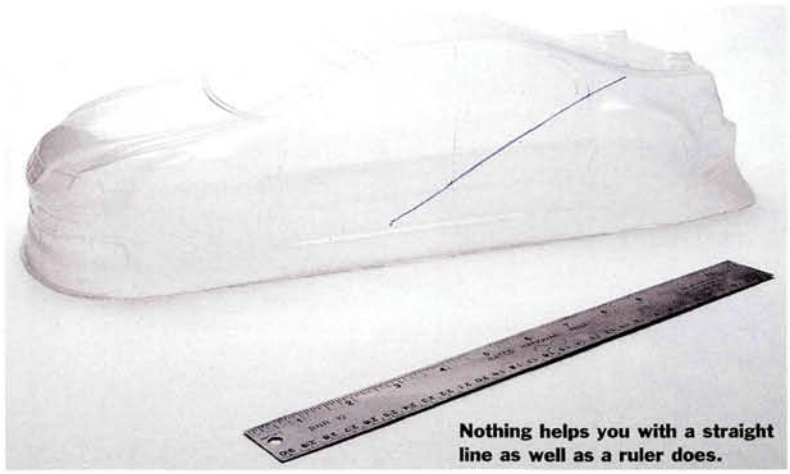
CURVED LEXAN SCISSORS

When you trim a body, nothing is as useful as a sharp pair of curved Lexan scissors. The short, curved jaws allow you to work around corners and in tight spaces where conventional cutters wouldn't fit. Keep them sharp by not using them to cut other materials. They're inexpensive, so at the first sign of wear, trade them in for a fresh pair.

HOBBY KNIFE

A razor blade or a hobby knife is essential and is used for everything from cutting masking and trimming stickers to scoring and fitting bodies. The typical choice is an all-purpose handle and a supply of no. 11 blades. Stock up on blades, and always use a brand-new blade every time you cut masking on a new body, so you won't have to press down as hard to cut.

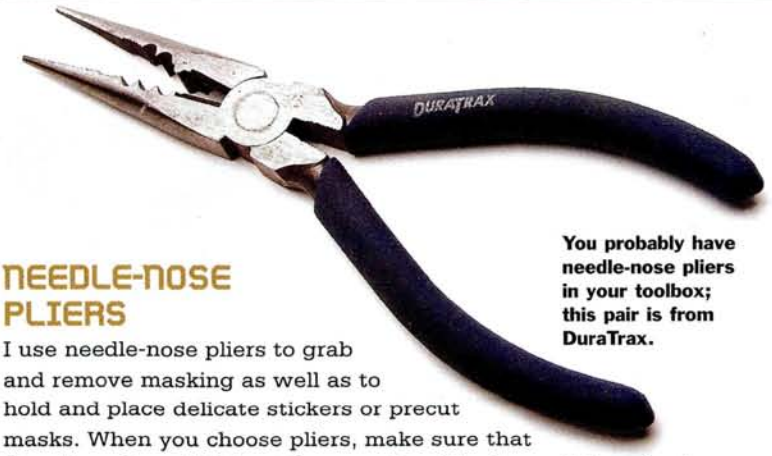
It's all about the blades. Choose any handle you like, but always use a sharp, new blade.



Nothing helps you with a straight line as well as a ruler does.

RULER

A flexible ruler can be very useful when you sketch out a design on a body. Typically, you would use it to draw straight lines or to mark scribe lines when you trim a body. When absolute symmetry is needed, a ruler is the perfect tool for ensuring that the designs match. Avoid using plastic rulers because they tend to skate around on bodies. Rubber-backed, flexible, stainless-steel rulers are the best.



You probably have needle-nose pliers in your toolbox; this pair is from DuraTrax.

NEEDLE-NOSE PLIERS

I use needle-nose pliers to grab and remove masking as well as to hold and place delicate stickers or precut masks. When you choose pliers, make sure that the pliers close tightly at the very tip of the jaws. If they don't, it will be nearly impossible to grab a thin piece of masking. Small hobby pliers are usually easier to hold and manipulate in a tight body, and those with curved or angled tips can be especially handy.

Pactra masking tape is available in a variety of widths and leaves a super-sharp painted edge.

MASKING TAPE

I always keep several types of masking tape in a variety of sizes on hand. I use regular 2-inch-wide masking tape to cover large areas, but when the tape has to hold a sharp edge, I rely on hobby-grade tapes. Parma FasTape and Tamiya masking tape are the best. Flexible, fine-line tape from Pactra is excellent for re-masking small areas and creating crisp edges. Fine-line tape also makes an excellent guideline for drawing straight lines. In situations where you can't use a ruler, e.g., to guide lines over the curves of a body, stretch a long piece of tape along the body and trace a line along its edge.

This eXtreme standZ paint stand makes a great addition to your paint shop.

PAINTING STAND

For very fine detail work, it sometimes helps to steady your painting hand with your free hand, and that means you need something to hold the body. The Ps eXtreme painting stand from eXtreme standZ acts as a third hand. Four rubber-tipped "fingers" hold the body, and the adjustable "neck" lets you position the shell for comfortable painting and trim work.

CIRCLE CUTTER

If you need to trim a circle, OLFA offers the best tool for the job.

A compass-style cutter like this one from Olfa is the ideal tool for cutting perfect circles. HPI bodies are actually designed for use with this tool, and they have pivot dimples in the fender wells to position the tool for a perfect fender cutout every time. The tool is also great for making 2-inch-diameter windshield openings required by ROAR rules. One tip: only make one pass, and as you would with a hobby knife, apply light pressure; the goal is to score the plastic so that you can peel out the waste, not to cut through it.

MASKING LIFTER

With the exception of a hobby-knife tip, which will slit the mask rather than lift it (or scratch the body—even worse), most sharply pointed tools make good mask lifters.

There's no better way to ruin a fresh paint job than by trying to peel off masking with your fingernails. You're more likely to scrape away paint than lift the mask! So, as simple as it is, a sharp, fine-tipped object is my most-used tool. I like to use an old airbrush needle, but many other items of a similar shape could be used. Depending on the job, you may use several tools that vary in size; I sometimes use a needle to lift up the edge of a mask and then use needle-nose pliers to remove it.

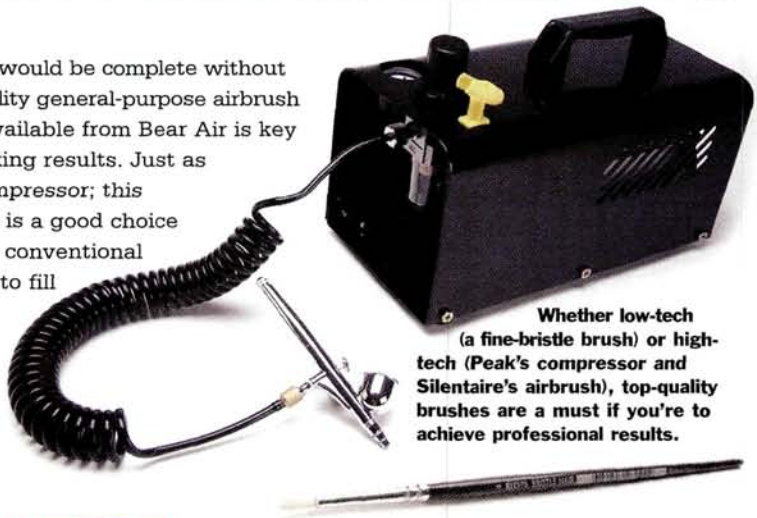
PERMANENT MARKERS

I draw all of my designs on the outside of bodies using permanent ink markers. They allow me to draw and redraw a design as many times as I like because despite its name, the ink isn't permanent on Lexan. If I don't like how the design came out, marks can be "erased" with isopropyl alcohol. For really complex designs, I use multicolored markers to layer design elements over one another and to write myself reminder notes right on the body of how sections should be painted.

Good ol' Sharpie! Parma also makes a double-ended detailing pen that has fine and broad tips that work great.

BRUSHES

No painting tool set would be complete without brushes. A high-quality general-purpose airbrush like this Peak C-5 available from Bear Air is key for professional-looking results. Just as important is the compressor; this Silentaire Scorpion I is a good choice and a solid value. A conventional brush is also useful to fill in smudge marks or chips. Pretty much any bristle type will do, but if you plan to do really fine details, invest in high-quality sable brushes. ■



Whether low-tech (a fine-bristle brush) or high-tech (Peak's compressor and Silentaire's airbrush), top-quality brushes are a must if you're to achieve professional results.

FIND IT
››› Go to page 250 for manufacturers' contact information.

INTEGY **INDI 16X3v6 charger**

INTEGY'S NEW INDI 16X3V6 CHARGER PACKS A LOT OF FEATURES INTO A SMALL PACKAGE. The bright-aluminum-cased charger looks high-tech and delivers a wide range of functions. With AC/DC capabilities, user-friendly design, multiple modes of operation and discharging and cycling capabilities, the 16X3v6 offers more than what you might expect from a $140 charger. Let's see how it holds up.

FEATURES

AC/DC OPERATION. The INDI v6 is set up for an AC power source, but it's also readily adaptable to 12V DC input with a simple Tamiya-style connector/cord setup. The regular AC input cord simply unplugs from the back of the charger.

BUILT-IN COOLING FAN. The INDI v6 has an aluminum case, so its built-in electric fan cools it and the charger's inner components. The case also has a series of vents cut into it, so the unit can charge and discharge pack after pack without overheating.

ADJUSTABLE CHARGE RATE. A knob on the 16X3v6's faceplate allows quick and accurate charge-rate changes. The rate is displayed on the LCD and can be adjusted from 0.5 amp to 6.5 amps.

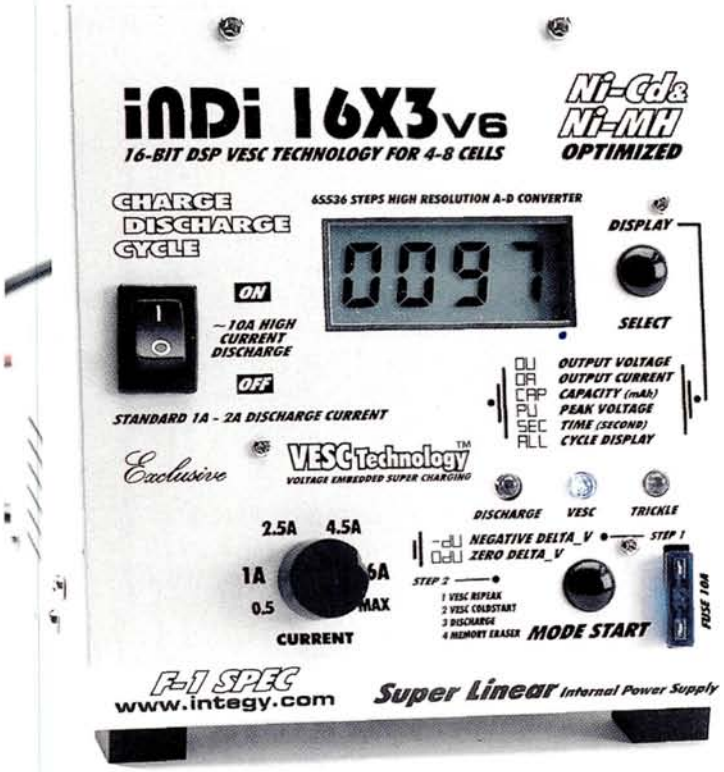
LCD SCREEN. An LCD screen shows the charge rate, peak voltage, output voltage, current, charging time and capacity. You can set it to automatically scroll through the menus or to allow you to toggle through them manually.

DUAL DISCHARGE RATES. A toggle switch allows you to change the INDI v6's discharge rate.

MULTIPLE CHARGE MODES. In addition to having the usual charge-to-peak mode you find on most chargers, the 16X3v6 can also re-peak charged packs and cycle your packs to output and lifespan. The 16X3v6 has four charge modes. In Mode 1, the voltage drop needed for peak detection gradually decreases as the pack is charged. This mode is typically used for small-cell packs or to re-peak racing packs. In Mode 2, the INDI v6 discharges the pack briefly before charging it. This Cold Start mode helps older, stubborn packs accept a full charge. Mode 3 is a standard discharge mode, and Mode 4 is the Memory Eraser mode that discharges, charges and then discharges the pack again. This is designed to breathe new life in old packs.

MANUFACTURER'S SPECS

Fast charge mode: Linear VESC peak/re-peak
Output range: 0.5 to 6.5A
Fuse type: 10A external
Discharge rate: 2A and 10A
Cell compatibility: 4 to 8 cells, Ni-Cd and NiMHs, 1100 to 3300mAh cells
Price: $140



RATINGS	
Function	●●●●○
Quality	●●●●○
Value	●●●●●

Housed in a strong, aluminum case, the 16X3v6 is small but loaded with features. A key for the LCD codes and the basic steps for starting the unit's charge and discharge modes are conveniently printed on its front plate.

TESTING

For the first phase of the 16X3v6's evaluation, I charged three 6-cell packs of different capacities. First, I charged a well-used 2000mAh Ni-Cd pack that hadn't been juiced up in several weeks. I set the current to 3 amps, and let the charger do its job. Once it powered up, the fan spun quickly. Although it was a bit noisy, the fan worked well, and the case remained cool. Fully charged in 34 minutes, I set the 2000mAh pack aside and hooked up a 2400mAh 6-cell pack to the Integy and set it to charge at 4 amps. Here again, the charger's case remained at nearly room temperature, and the pack peaked out at the 50-minute mark on the LCD. I also had a partially charged 3300mAh NiMH pack to re-peak, so I set up the Integy to charge at its highest rate; I had a fully charged pack in only six minutes. Its shutdown beeper lets you know when the battery is fully charged; I could hear the unit go into its trickle mode from across the pits. After charging three packs, the INDI v6 was still ready for more.

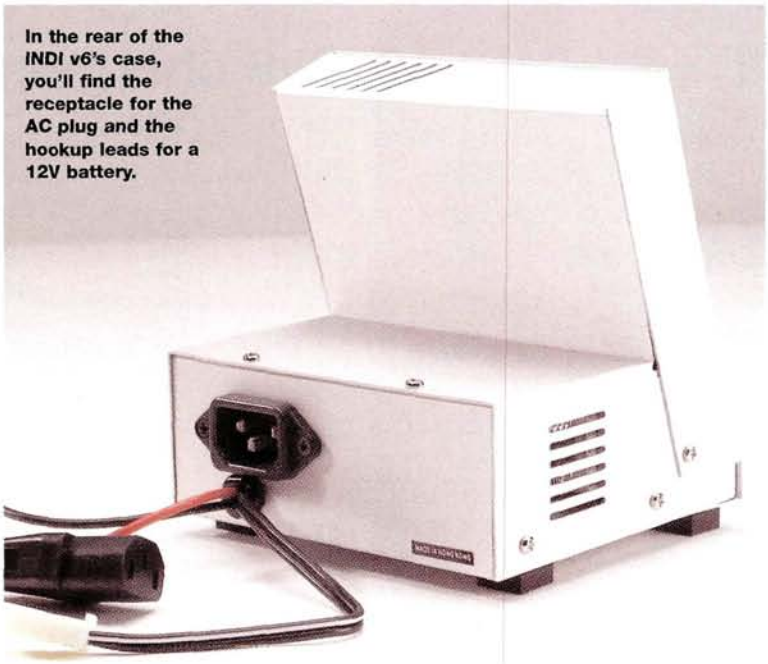
Next, I tested the Integy's Memory Eraser mode on a 3000mAh NiMH 6-cell pack. This feature is designed to rid your cells of internal crystalline buildup. The INDI v6 discharges, charges and ultimately deep-discharges the pack to keep your packs properly cycled. I've charged/discharged all of my packs this way, and they now accept more voltage than they did before. You won't be able to use this mode on really small cell receiver packs; but you won't have any problems

charging them on the INDI v6's re-peak mode or at 0.05 amp on the unit's regular charge cycle. I didn't observe any heat buildup in the cells being peaked or discharged, and on a pit table in 90-degree weather, the Integy's aluminum case also remained cool.

THE VERDICT

No matter which type of 4- to 8-cell pack I threw at the Integy INDI 16X3v6 unit, it performed well—no false peaks, blown fuses or other typical glitches. Simple to operate and adjust, it has every charging and discharging feature you could want, and it can operate on any input power source. The unit's fan is a little loud, but it cools the charger well, so I can live with the noise. Beyond that, the Integy INDI 16X3v6 is a well-made, highly-capable, battery-management system that's well-suited to the workbench and the pit.
—*Rick Eyrich*

INTEGY INDI 16X3v6 charger—E2013V6; $140.
Integy; integy.com.



In the rear of the INDI v6's case, you'll find the receptacle for the AC plug and the hookup leads for a 12V battery.

The fuel gun can be screwed onto a gallon fuel jug for dirt-free storage and easy refueling.

RATINGS	
Function	●●●●●
Quality	●●●●●
Value	●●●●●

DYNAMITE
Fuel gun

Dynamite offers a new product that could shave off several seconds in the pits during long Mains. This 250cc fuel gun fills a 125cc tank in seconds and shuts off automatically as long as the tip of the gun is in the tank. The red-anodized aluminum filler neck extends 4 inches, so it's easy to reach your tank through most bodies. The fuel gun's stock is black plastic and is attached to an O-ring-sealed 250cc fuel bottle that can be swapped for a 500cc reservoir. At the base of the filler neck, you'll find something ingenious: an adapter that allows you to secure the fuel gun to most plastic fuel jugs. This provides a convenient way to store the gun and keep the filler neck clean and also makes it easy to refill. Several O-rings keep the gun sealed at the joints, and Dynamite includes an additional plunger seal. The fuel gun is ROAR-, NORCA- and IFMAR-legal for sanctioned racing.

The fuel gun weighs 17.6 ounces when full (7.5 ounces empty) and is easy to hold. The handle and trigger are comfortable and can accommodate large hands. You can fill the gun with fuel in three ways: by placing the gun's tip into a gallon of fuel and then squeezing the fuel bottle on the gun to draw fuel into its reservoir; by screwing the gun onto a jug of fuel, inverting it and pulling the trigger; and by unscrewing the reservoir from the gun and filling it from a separate fuel bottle. To confirm Dynamite's claim that a 125cc tank can be filled in less than two seconds, I did a bench-test and timed the gun. I filled it with exactly 250cc of fuel, held the trigger wide-open for two seconds and then measured how much fuel was left in the reservoir. I used a stopwatch and repeated the test 12 times. The gun consistently dispensed 200cc of fuel in two seconds—easily proving Dynamite's claim. Throughout the tests, the gun performed consistently and without leaking. One note: it's essential to keep the vent tube clear. If the vent tube is not clear for air to pass through freely, you will experience a reduction in fuel flow. To avoid this, don't overfill the reservoir, and purge the vent tube by squeezing the fuel bottle just enough to eject any residual fuel.—*David C. Konneker*

DYNAMITE FUEL GUN—DYN2015; $30.
Dynamite; distributed by Horizon Hobby (800) 338-4639; dynamiterc.com.

PRO EXOTICS
PE-2 Temp gun

The new PE-2 temp gun from Pro Exotics packs a lot of premium features such as a sighting laser, multiple modes, low-battery indicator and a one-year warranty. Two battery covers are on the back of the gun for two CR-2032 batteries. One battery is dedicated to the laser, and the other is for the thermometer. The laser runs off a separate battery and is activated by pressing the measure button. The gun also has a visual battery-status indicator because low batteries can impact the consistency of the gun's readings. The PE-2 has three selectable modes: minimum temperature mode displays the lowest temperature when you press the button; maximum temperature is similar to the minimum mode; and the lock mode locks the gun on for continuous operation while the laser is inactive. The PE-2 is medium in size compared with other miniature temp guns on the market and is 22mm thick, 50mm wide and 110mm long with an oblong shape that fits comfortably in the palm of the hand. It can detect temperatures between minus 27 and 482 degrees Fahrenheit and also displays Celsius readings. It features a tight distance-to-spot ratio, which is the size of the area you read the temperature off compared to the gun's distance from the object. At a distance of 8 inches from the object, it can read an area just 1 inch in diameter. Hot surfaces can have small target areas (like around a glow plug), therefore a temp gun with a tighter distance-to-spot ratio can measure small areas more precisely.

RATINGS	
Function	●●●●●
Quality	●●●●○
Value	●●●●○

To bench-test the accuracy and consistency of the PE-2 temp gun, I decided to take temperature readings of boiling water that always measures 212 degrees F—very repeatable and a simple test to conduct. I boiled distilled water on my stove for a few minutes and then took several readings with the temp gun. I found the PE-2 to be very consistent and accurate. The PE-2's shape is ergonomic and its buttons are easy to use. Switching between the three modes is effortless, and the large display was easy to see outdoors. I found the second mode that displays maximum temperature helpful for seeing how hot an engine runs especially during break-in.

The PE-2 worked flawlessly on the bench and in the field. I am impressed with the clever features Pro Exotic has incorporated in its guns. The PE-2 is a versatile tool to have in your field box and around the pits regardless of whether you run nitro or electric. Today's onboard components are expensive, and extreme heat is your enemy; therefore, monitoring and managing heat will help you get the most out of your investment.—*David C. Konneker* ■

Pro Exotics PE-2 Temp gun—PE-2; $45.
Pro Exotics (303) 347-0500; tempgun.com.

Dremel (800) 437-3635; dremel.com.

Dynamite distributed by Horizon Hobby; dynamiterc.com

Fantom Racing (269) 649-9583; fantomracing.com.

Hitec RCD Inc. (858) 748-6948; hitecrcd.com.

Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

HPI Racing (949) 753-1099; hpiracing.com.

Jaco Racing Products Inc. (540) 298-0446; jacoracing.com.

J-B Weld (903) 885-7696; jbweld.net.

KO Propo USA Inc. (310) 532-9355; kopropo.com.

LRP distributed by Team Associated.

Motor Saver Filters (909) 247-9928; motorsaverfilters.com.

OFNA Racing (949) 586-2910; ofna.com.

Parma/PSE (440) 237-8650; parmapse.com.

Pro-Line (909) 849-9781; pro-lineracing.com.

Protoform Inc. distributed by Pro-Line (909) 849-9781; pro-lineracing.com.

Racers Edge (866) 855-5566; racers-edge.com.

Reedy a division of Team Associated (714) 850-9342; teamassociated.com.

SMC (540) 298-7706; smc-racing.com.

Sportwerks distributed by Horzion Hobby Inc.

Sullivan (410) 732-3500; sullivanproducts.com.

Tamiya America Inc. (800) 826-4922; tamiyausa.com.

Team Associated (714) 850-9342; teamassociated.com; rc10.com.

TRC (732) 635-1600; teamtrinity.com.

Trinity (732) 635-1600; teamtrinity.com.

Triton distributed by Great Planes Model Distributors (800) 682-8948; greatplanes.com.

White Lightning distributed by Horizon Hobby Inc.

XRAY distributed by RC America (214) 744-2400; teamxray.com.

Zegers R/C Graffixx (561) 988-5411; zegersrcgraffixx.com.

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ALABAMA

Hobby Raceway, Tuscloosa, Alabama 35405; Tony Brothers, 205-339-4950; email: gotjuice@comcast.net

Mobile Miniature Speedway, Theodore, Alabama 36582; Richard Sweetser, 251-653-6643; email: jbogard@comcast.net; web: mywebpages.comcast.net/jbogard

North Cullman Raceway, Cullman, Alabama 35055; Daniel Lolies, 256-775-2491; email: cullmanrchobbies@yahoo.com; web: www.cullmanrchobbies.homestead.com

Oak Mountain Hobbies, Pelham, Alabama 35124; Jay Simpson or Charles Rosato, (205) 685-8980; email: jsimp@oakmtnhobbies.com; web: www.oakmtnhobbies.com

ARIZONA

HobbyTown Raceway--Tuscon AZ, Tuscon, Arizona 85713; Jay, (520) 882-8888; web: www.hobbytown.com

HobbyTown U.S.A.--Phoenix AZ, Phoenix, Arizona 85044; Doug McFarland, (480) 598-5282

R/C Sports Mania Raceway, Phoenix, Arizona 85017; Mike Lubanovich, (602) 278-3671; email: info@rcsports-mania.com; web: www.rcsportsmania.com

Scottsdale R/C Raceway, Scottsdale, Arizona 85251; Scott Anfinson, 480-945-2186

ARKANSAS

Alison OffRoad RC Raceway, Little Rock, Arkansas 72206; Steve Alison, (501) 490-1227; email: otto@alisonoffroad.com; web: www.alisonoffroad.com

GS Hobby, Ft. Smith, Arkansas 72901; Bryon Shumate, (501) 648-1994; web: www.gshobby.com

Sparks R.C. Raceway, Paragould, Arkansas 72450; Tommy Sparks, (870) 239-3606

CALIFORNIA

Capital City R/C, Sacramento, California 95829; James Patterson, 916-383-3445; email: capitalrc@hotmail.com; web: www.capitalrc.com

Castle Hobbies, San Jose, California 95124; Steve Scott, 408-377-3771; web: www.castlehobbies.com

Crystal Park Raceway, Compton, California 90202-4925; James Reese, 310-631-0307; email: mailto:info@crystalparkraceway.com

Delta R/C Raceway & Hobbyshop, Antioch, California 94509; Rick or Steve, (925) 778-2965; web: www.deltarc.com

Extreme RPM Hobbies, Grand Terrace, California 92313; Bobby Haney, 909-370-3379; email: Extremerpmrace@aol.com; web: www.ExtremeRpmRacing.com

Hobby Central Raceway, Poway, California 92064; Lee, (858) 513-0373; web: www.hobby101.com

Hobby World, San Jose, California 95129; Guy Bassett, (408) 873-2109

Hot Rod Hobbies, Saugus, California 91350; Jimmy Babcock, (661) 255-2404

Jake's Performance Hobbies, Rohnert Park, California 94928; Jake, (707) 586-3375; email: jphracing001@aol.com; web: jphracing.com

Palm Desert OffRoad R/C Raceway, Palm Desert, California 92260; Bob Barrett, 760-341-5699; email: htupalmdesert@msn.com; web: www.hobbytown.com

Paradise Hobbies & RC Raceway, Paradise, California 95969; David Lafabregue, (530) 877-6447; email: paradisehobbies@aol.com; web: www.paradisehobbies.com

Pure Adrenaline RC & Hobby, Sonora, California 95370; Matt, (209) 536-6232; email: contact@pahobby.com; web: www.pahobby.com

Racer's Haven Raceway, Bakersfield, California 93309; Greg Cooper, 661-835-0441; web: www.racers-haven.com

Rescue Mini R/C Speedway, Rescue, California 95672; Bruce Pease, (530) 621-3948; web: www.innercite.com/~rcracing/

Ripon R/C Speedway, Ripon, California 95366; Dan Tanis, (209) 599-5160

Sacramento RC Racing & Hobbies, Sacramento, California 95824; Andreas Muller, (916) 424-4001; email: andreas123@earthlink.net; web: www.77sunset.com

Showtime R/C Speedway, Bakersfield, California 93301; Don Risner, 661-328-1481; email: showtimespeedway@aol.com; web: www.showtime-speedway.com

So Cal R/C Raceway, Huntington Beach, California 92646; Jim or Lana, 714-963-7484; email: info@socalrc.com; web: www.socalrc.com

SpeedWorld Raceway, Roseville, California 95678; Billy Bowerman, 916-783-8864; email: speeddog@mindsync.com; web: speedworldraceway.com

The Dirt Valley R/C Racepark, Hemet, California 92544; Joe Christenson, (909) 925-7592

Ventura RoadRunners, Camarillo, California 93010, 805-564-4144; email: dudebigal@aol.com; web: www.venturaroadrunners.com

COLORADO

MHOR R/C Raceway, Aurora, Colorado 80011; Jess A. Brockman, (303)343-0151; email: questions@mhorrc.com; web: www.mhorrc.com

Valley West Off-Road RC Club, Grand Junction, Colorado 81504; Jodie Grein, 970-242-1412; email: geerhed@gj.net; web: www.gj.net/~geerhed/vworcind.html

CONNECTICUT

K&N R/C Speedway Inc., Stafford Springs, Connecticut 06076; Jim or Bill, (860) 684-9896

Manchester Hobbies, Manchester, Connecticut 06040; Jim or Mike Tierinni, (860) 643-4768

R/C Madness, Enfield, Connecticut 06082; Christopher Marcy, (860) 741-6501; email: cmarcy@rcmadness.com; web: rcmadness.com

SpeedZone Raceway, Cromwell, Connecticut 06416; David Kahn, 860-632-9278; email: info@speedzone-hobbies.com; web: www.speedzone-hobbies.com

Xtreme Radio Control, New Milford, Connecticut 06776; Paul or Pete, (860) 354-4703

DELAWARE

ESRC, Seaford, Delaware 19973; Bill Auchterlonie, 302-734-2757/302-629; email: aeromarine@erols.com

FLORIDA

B&T RC Central, Fort Walton Beach, Florida 32547; Tim, 850-863-1666

Daytona/Strickland RC Park, Holly Hill, Florida 32174; Mike Wichman, 386-677-0898; email: moxnicht@aol.com; web: http://daytona-rc.homeip.net/

Farmers Hobby Shop & Raceway, Tampa, Florida 33619; Greg Cardone, 813-248-3314; web: www.farmershobby.com

First Coast Speedway, Jacksonville, Florida 32211; Bobby Phillips, 904-716-0861; web: www.firstcoastautoracing.com

G&C Hobby Raceway, Lantana, Florida 33462; George, 561-547-3812; email: gnchobbies2@cs.com; web: www.gnchobbies.com

GBs Hobbies, Port St. Lucie, Florida 34952; Track Owner, 561-460-2844; email: qaircrft@bellsouth.net

Grand Prix RC-Club, Ft. Pierce, Florida 34945; Luther Peterson, 772-473-2130; email: grandprixhobbies@aol.com; web: www.grandprixhobbies.com

Hobby Central, Pensacola, Florida 32504; Bill McLester, 850-471-9800; email: info@hobbycentralrc.com; web: www.hobbycentralrc.com

Hobby World Raceway, Jacksonville, Florida 32210; Greg, (904) 772-9022

Kissimmee R/C Auto Racing, Kissimmee, Florida 34741; John Rosser, (407) 944-4913; email: john@craftworldflorida.com; web: www.craftworldflorida.com

Miami RC Raceway, Miami, Florida 33176; Mickey Cerra, (305) 630-3714; email: miamircraceway@aol.com

Minnreg R/C Club, Largo, Florida 33773; Sam Ledford, 727-403-7110; email: sledford@tampabay.rr.com; web: www.minnregrcc.com

Monza R/C Speedway, Miami, Florida; Ed Delgado, (305) 437-9895

Morris Kohl's Raceway and Hobby Shop, Tampa, Florida 33604; Morris Kohl, (813) 931-1626

My Rose Hobbies & Crafts, Jupiter, Florida 33458; Mark Watson, (561) 744-3800

NORRA, Naples, Florida 34104; Rob Dondoerfer, 239-417-1099; web: www.norra.mainpage.net

Pro Hobbies Speedway, Apopka, Florida 32712; Jim, (407) 886-4615; email: prohobby@juno.com

Sarasota RC Speedway, University Park, Florida 34201; Jim Wilson, (941) 358-7047

South Palm Beach Racers, Boca Raton, Florida 33486; Mike Fazio, 561-338-5367; email: epine01@bellsouth.net; web: http://communitylink.gopbi.com/groups/spbrclub

Superior Hobbie R/C Parking Lot Racing, Casselberry, Florida 32707, (407) 834-9299; email: racing@superiorhobbies.com; web: www.superiorhobbies.com

SWF RC Car Club, Fort Myers, Florida 33908; Hobby House of Ft. Myers, 239-415-0033; email: hobbyhouseofft-myers@msn.com

Tallahassee R/C Speedway, Tallahassee, Florida 32301; Tim Cook, 850-514-3365; email: idothtre@hotmail.com; web: www.tallahasseerc.com

Tampa R/C Raceway, Seffner, Florida 33584; Carole Raimondi, 813-655-6366; email: carolehobbytown@aol.com

Treasure Coast R/C Club, Palm City, Florida 34990; Doug Goethel, 772-283-2260; email: 1ringo@adelphia.net

West Coast R/C Club, Lutz, Florida 33549; Jim Larrimore, 813-368-4962

GEORGIA

Augusta R/C Racer's Club, Augusta, Georgia 30909; Darren, 706-860-5608; web: Augusta.rc.freehomepage.com

KEY TO SYMBOLS

	Indoor		Concrete
	Outdoor		Asphalt
	Off-road	M	Minis & Micros
	On-road		On-site hobby shop
	Oval		AC power
	Dirt oval		Auto lap counting
	Carpet		Food available

Dalton Motorsports, Dalton, Georgia 30721; Keith Manton, 706-226-6699; email: dmso@aloteo.net

Echeconnee Superspeedway, Macon, Georgia 31216; Clifford Kline, 478-256-2032; email: gtock1000@aol.com

Hobby Town Raceway, Columbus, Georgia 31909; Frank Bastos, (706) 660-1793; email: fbastos@mindspring.com; web: www.hobbytown.com

Primetime Raceway, Calhoun, Georgia 30701; Tommy Jackson, 706-625-9037; email: primetimehobby@gccinternet.net; web: primetimehobby@gccinternet.net

SCORE-Phil Hurd Raceway, Savannah, Georgia 31406; Dana Franklin, Club President, 912-308-8545; email: bonescom@bellsouth.net; web: www.score-racing.org

The Flight Box Hobby Shop, Rome, Georgia 30161-6826; Leslie Duke, (706)-234-3014

HAWAII

A.S.I. Racing, Kapaa Kauai, Hawaii 96746; Arnold Morales, 808-821-8132

Radio Control Assoc./Alaa Park Raceway, Pearl City, Hawaii 96782; Ace R/C Products, (808) 456-1279

Sandy Flemings, Pearl City, Hawaii 96782; Dave Caldwell, 808-456-7272; email: info@formula1-rc.com; web: www.formula1-rc.com

IDAHO

Almosta Ranch RC's, Twin Falls, Idaho 83301; Casey Clements, (208) 733-8667; email: cclements2@msn.com

Capital Dirt Burners, Boise, Idaho 83702; Jeff Mills, 208-376-8932; email: jeffmills928@msn.com; web: www.capitaldirtburners.com

DM Raceway, Pocatello, Idaho 83201; Mike Buffaloe, 208-233-8163; email: mike@dmraceway.com; web: www.dmraceway.com

ILLINOIS

AJs Raceway & Hobby, Dekalb, Illinois 60115; AJ, 815-756-2772; web: www.ajsraceway.com

C&R Hobbies, Milford, Illinois 60953; Ray Craighead, 815-889-4073; email: thomas@millnet.net

C.I.R.C.A., Jacksonville, Illinois 62650; Randy Tendick - Sport-N-Hobby, (217) 245-1375; web: http://www.geocities.com/jaxcirca/

His N Hers Hobbies Raceway, Bloomington, Illinois 61701; Kevin Turek, 309-827-0204; email: hisnhershobbies@aol.com; web: www.hisnhershobbies.com

HobbyTown USA - Oak Park, IL, Oak Park, Illinois 60301; Mark or Fred, (708) 445-8056; email: htuopil@aol.com

Machesney Park Raceway, Machesney Park, Illinois 61115; Gina, (815) 282-1311; email: mpr30@aol.com; web: www.mpr30.homestead.com

Monee R/C Raceway, Monee, Illinois 60449; Roy or Roberta Moody, (708) 534-2422

Venture Raceways, Libertyville, Illinois 60048, (847) 549-6963

INDIANA

Bremen Racing Ent., Bremen, Indiana 46506; Dale Heuberger, 219-546-3807

Duneland Hobbies & Raceway, Portage, Indiana 46368; Ron, 219-763-1610; email: RTrobaugh1@email.msn.com; web: www.dunelandhobbies.com

Hobby Barn Raceway, Terre Haute, Indiana 47802-9694, (812) 299-5773

Madison Funwheelers Carpet Oval, Madison, Indiana 47250; Charlie Hatchel, 1-812-866-8930

Pete Russell's R/C Speedway, Elkhart, Indiana 46516; Pete Russell, 574-293-1827

R/C World of Indiana, Lynn, Indiana 47355; Joe Kolp, (765) 874-2464; email: rcworld@rcworld.com; web: www.rcworld.com

RC Barn, Monroe, Indiana 46772; Mark Lengerich, (219) 692-6600; email: bigdaddy@adamswells.com; web: www.rcbarn.com

RCRCR Raceway, Boonville, Indiana 47601; Scott Payton, 812-573-6087; email: email@rcrcr.com; web: www.rcrcr.com

Schoolyard RC Speedway, Lagrange, Indiana 46761; David W. Bryan, 260-463-3598; email: dwbryan@locl.net; web: www.rcspeedway.net

Showtime Lot Racing, Fort Wayne, Indiana 46819; Mike Romines, (219) 478-6099; web: fortwaynercpark.tripod.com/

IOWA

Ames Radio Control Speed Assoc., Ames, Iowa 50014; Ryan Davis/Brad Scandrett, 515-231-3813/515-432; email: Davismotorsp@aol.com

Dubuque R/C Speedway, Dubuque, Iowa 52002; Dave Kleinschrodt, 563-556-8524; email: rccraig7@aol.com; web: www.geocities.com/dbqrc

Hobby Haven, Urbandale, Iowa 50322; Rick Marble, (515) 276-8785; web: www.hobbyhaven.com

Independence, Independence, Iowa 50644; Eugene Bachman, 319-266-3857; email: BachmanE2@hotmail.com

Iowa City R/C Racing Association, Iowa City, Iowa 52240; Hobby Corner, (319) 338-1788

IROAR-Vinton Raceway @ Vinton Roller Rink, Cedar Rapids, Iowa 52402; Ed Karr, 319-362-1291; email: boxkarhoby@aol.com

Manly R/C Club, Manly, Iowa 50456; Bruce Hill, (641) 454-2025

Marble's Raceway, Des Moines, Iowa 50317; Rick Marble, (515) 262-7507

Radio Control Raceway Park, Fort Dodge, Iowa 50501; Bernie Halverson, (515) 576-3780; email: bernieh@frontiernet.net

RiverFront Speedway, Fort Dodge, Iowa 50501; Bernie Halverson, 515-576-3780 (515-57; email: bhalverson@dodgenet.com

Wild Bill's Raceway, Knoxville, Iowa 50138; William Anderson, Jr., 641-842-5973; email: wildbilz@iowatelecom.net; web: www.wildbillsracing.com

KANSAS

D&B Raceway, Menlo, Kansas; Ron Ball, (785) 855-2370

KENTUCKY

Coyote Raceway, Lexington, Kentucky 40505; Steve M., 859-253-9330; email: coyoterace1@hotmail.com; web: www.coyoteraceway.com

Dixon's R/C RaceWay, Hazard, Kentucky 41701; Jeff Dixon, (606) 436-4820; email: jeffdr1@hotmail.com

Mayking R/C Speedway, Mayking, Kentucky 41837; Jon Fields, 606-633-4700; email: jon1@se-tel.com

Pit Stop Hobbies, Paducah, Kentucky 42003; Robert or Rodney, 270-443-0052; email: pitstop1@apex.net

R.C.WOW, Falmouth, Kentucky 41040; John P. Jones, (859) 654-1700; email: rcwow@fuse.net; web: www.rcwow.com

Trio Hobbies & R/C, Radcliff, Kentucky 40160; Maurice Johnson, (502) 351-7547

Wildcat Speedway, Nicholasville, Kentucky; David Bowles, 859-272-0231

LOUISIANA

Fast Pace Hobbies, Alexandria, Louisiana 71301; Joseph or Casey Toralba, 318-561-2070; email: fastpacehobbies@aol.com

Gator R/C Raceway, Moss Bluff, Louisiana 70612; Tony Diaz, 337-855-3206; email: keithsjac@aol.com; web: homepage.mac.com/kmaples/

Hwy. 44 Hobby Shop, Gonzales, Louisiana 70737; Eric Olmstead, (225) 644-1773; email: eric209@aol.com

Red Stick R/C Raceway, Baton Rouge, Louisiana 70814; Michael Pino, 225-218-1002; email: redstickraceway@aol.com; web: www.redstickraceway.com

St. Charles RC Speedway, Destrehan, Louisiana 70047; Al Cazalot, (504)764-0625; email: stcharlesracer@home.com; web: members.home.net/stcharlesracer

MAINE

Central Maine R/C Speedway & Hobbies, Fairfield, Maine 04963; David Prescott, (207) 453-4588; email: rcracer@mint.net

Clay Bowl R/C Hobbies, Greene, Maine 04236; Pat Cap, (207) 946-5003

MARYLAND

Coles Race Way, Waldorf, Maryland 20602; Cole Brincefield, (301)-843-1386; email: kbrincefield@cs.com

GPA Hobbies, Crofton, Maryland 21114, 301-858-0004

HobbyTown USA--Glen Burnie MD, Glen Burnie, Maryland 21061; David Parkison, 410-590-4950; email: racing@mdhobbytown.com; web: mdhobbytown.com

The Track, Gaithersburg, Maryland 20877; Mimi Wong, (301) 417-9630; email: mimithetrack@yahoo.com; web: www.rctrack.com

Trifecta Hobbies, Prince Frederick, Maryland 20678; George or Mike, 410-414-9000; email: gmitchell@trifectahobbies.com; web: trifectahobbies.com

MASSACHUSETTS

Big Boys Toys, Fall River, Massachusetts 02723; Track Owner, 508-677-9400

East Templeton Model Raceway, Templeton, Massachusetts 01468; Keith Anderson, 1-978-632-1619; email: keith@glowplug.com; web: glowplug.com

Hi-Tech Hobbies, Raynham, Massachusetts; Ruben, (508) 880-5373

Megadrome Raceway, North Adams, Massachusetts 01247; Bob Blanchette, 413-743-7223

Northboro Speedway, Northboro, Massachusetts 01532; Bob Trimble, 508-393-8087

R/C Excitement, Inc., Worcester, Massachusetts 01606; Todd Anderson, 508-853-3272; email: rcexcitement@aol.com; web: www.rcexcitement.com

RPM RC Raceway, Abington, Massachusetts 02351; Richard Tonetti, 781-857-1177; email: rpmrc@yahoo.com; web: www.rpmrc.com

MICHIGAN

D.R. R/C, Taylor, Michigan 48180; Bobby or Fred, (734) 287-7405; web: www.downriverracing.com

Dirt Burner Racing, Commerce, Michigan 48390; Bill, 248-926-1140; web: www.dirtburnerracing.com

E.U.P., Kincheloe, Michigan 49788; Joel Wiggins, 906-495-3503

Fastraxx, Brownstown, Michigan 48173; Greg Yingling, (734) 379-8980; email: fastt3@hotmail.com

Great Lakes Racers Club, Grand Rapids, Michigan 49858; John Warner, 616-838-2231; email: Gr8LksRacers@aol.com; web: www.rogers 3.com/glrc/

Hideaway Raceway, Napoleon, Michigan 49201; David Carlisle, 1-517-536-8821; email: adcarlisle1@netscape.net

Jons Hobby, Mt. Pleasant, Michigan 48858; Jon Beutler, 989-773-5412; email: jonshobby@earthlink.net; web: www.jonshobby.com

JT Superspeedway, Battle Creek, Michigan 49015; Jerry or Sam, 616-965-0116

Larry's Performance RC Carpet Track, Sterling Heights, Michigan 48314; Larry, 586-997-4840; email: lprcs@qwest.net

Lazer RC Speedway, Adrian, Michigan 49221; Russ Johnson, (517) 263-2806

N.M.R.C.C. Speedway, Gaylord, Michigan 49735; Gabe, (989) 732-3963; email: hobby-toy@voyager.net

R&L Hobbies & Racing, Portage, Michigan 49002; Rex Simpson, (616) 323-3686; web: www.rlhobbies.com

R.A.C.E. Inc., Jackson, Michigan 49203; Sam Sprang, (517) 787-9161

Raw Roots Race Tracks, West Olive, Michigan 49460; Roy Bennink, (616) 399-9338; email: rstb@tm.net

Village Hobbies, Hesperia, Michigan 49421; Al Deater, 231-854-6666; email: vhobbies@hotmail.com; web: vhobbies@tdats.net

Village R/C Raceway, Decateur, Michigan 49045; Chuck Nolke, (616) 423-7878

MINNESOTA

Country R/C Raceway Park, Belview, Minnesota 56214-8115; Charles L. Steffl, 507- 641-8115

J's Radio Control Race Park, Starbuck, Minnesota 56381; Jay Campbell, (320) 239-4827

Kevin's Off-Road Raceway, Crookston, Minnesota 56716-2317; Kevin Altepeter, (218) 281-7523; email: kevin@krcproducts.com; web: www.krcproducts.com

National Speedway, Fridely, Minnesota 55432; Steve Hedenland, 763-571-9283; email: mrtip@nationalhobby.com; web: www.nationalhobby.com

Northwoods Hobby Raceway, Brainerd, Minnesota 56401; John or Doug, (218) 829-9257

Twin Cities Hobby & Raceway, Brooklyn Park, Minnesota 55428; Mark O'Brien/Ray Cook, (763)315-8700; email: wooduster@msn.com; web: www.twincityhobby.com

MISSISSIPPI

Meridian RC Speedway, Meridian, Mississippi 39302; Joe or Pearce, 601-483-7000

Small Cars Unlimited, Jackson, Mississippi 39212; Ed Hill, 601-372-3278; email: fast@smallcarsunlimited.com; web: www.smallcarsunlimited.com

X-Treme RC, Saucier, Mississippi 39574; Marty Capers, (228) 539-2004

MISSOURI

B&L Hobbies & Raceway, Park Hills, Missouri 63061; Bob Marler, (573) 431-9444; web: www.bandlhobbies.com

Fastlane Raceway & Hobbies, Blue Springs, Missouri 64015; Shane & Randy, (816)220-0100; email: info@fastlanehobby.com; web: www.fastlanehobby.com

Hobbies In Motion Raceway, Springfield, Missouri 65803; Matthew Froning, 417-886-9621; email: mrkidturismo@aol.com; web: www.gorc.com

North Missouri Raceway, Chillicothe, Missouri 64601; Billy Johnston, (660) 646-1120

Novelty R/C Raceway & Hobbies, Novelty, Missouri 63460; Rex & Jena Franke, 660-739-4530; email: noveltyrc@noveltyrc.com; web: www.noveltyrc.com

Ozarks R/C Raceway, Springfield, Missouri 65803; Gene Rhodes, 417-873-9350(Track),; email: OzarksRaceway@aol.com

RCTRAX Racing Club of Central Missouri, Hallsville, Missouri 65255; Gary Phillippe, 573-442-8183; email: phillip74@verizon.net

Real Blue Vue R/C, Kansas City, Missouri 64133; Steve Hale, (816) 358-0238; email: hrealrc@aol.com; web: www.geocities.com/real_rc_raceway

Real R/C Raceway, Pleasant Hill, Missouri 64080; Steve Hale, (816) 540-5584; email: hrealrc@aol.com; web: www.real-rc.com

Showtime Speedway, Bakersfield, Missouri; Don Risner, (601) 203-1481

MONTANA

Garden City R/C Speedway, Missoula, Montana 59801; Brian Culp, (406) 549-7992; email: gardencityrc@msn.com

Magic City Racers, Billings, Montana 59102; Bryan Grummett, 406-656-8266; email: jsaves@tgrsolution.net; web: www.magiccityrc.com

RC Offroad Association of Racing (ROAR), Libby, Montana 59923; Jamie, 406-293-6506; email: sharkboyet@hotmail.com

NEBRASKA

Hadar R/C Raceway, Norfolk, Nebraska 68701; John Schoenauer, (402) 644-7922

Hobby Town USA Raceway Park-Nebraska, Lincoln, Nebraska 68508; Chad, 402-434-5062; email: lincolnrcracing@alltel.net; web: www.lincolnrcracing.com

NESCAR Raceway, Grand Island, Nebraska 68801; Steve Blayney, (308) 382-0920; email: blayneyracing@hotmail.com

O.N.R.O.A.D., Omaha, Nebraska 68104; CoRK Jacobs, (402) 556-8674

OTWG Carpet Raceway, Norfolk, Nebraska 68701; John Schoenauer, (402) 644-7922

The Salvation Army Speedway, Omaha, Nebraska 68164, 402-734-3414

NEVADA

1st Place Raceway, Fallon, Nevada 89406; Stan Lattin, 775 -867- 3357; email: info@1stplacerace.com; web: www.1stPlaceRace.com

Dansey's Indoor R/C & Hobbies, Las Vegas, Nevada; David Lugo, (702) 453-RACE or (8; web: www.danseys.com

Las Vegas R/C Raceway, Las Vegas, Nevada 89139; Patrick Quinn, 702-365-1396; email: patrickquinn98@lvcm.com; web: www.lasvegasrcraceway.com

T-Rix bikes & R-C shop, Elko, Nevada 89801; Gary Perkins, (775)777-8804; email: mtnman14k@hotmail.com

NEW HAMPSHIRE

Hill Top R/C, Troy, New Hampshire 03465; Pete Bastoni/Jim MacPherson, 603-242-3222; email: hilltoprc@netryders.com; web: www.hilltoprc.com

Lakes Region R/C Speedway, Gilford, New Hampshire 03246; Louie Blais, 603-524-2909; email: racing@lakesregionrc.com; web: www.lakesregionrc.com

RT 106 Racepark, Pembroke, New Hampshire 03275; David Daniels, 603-224-7223; email: david@collectracing.com; web: www.106racepark.com

NEW JERSEY

America's Hobby Center Inc., North Bergen, New Jersey 07047; John Many, (201) 662-0777; web: www.ahc1931.com

Back Track Raceway, Hammonton, New Jersey 08037; Bob W., 609-214-5016

Checkerboard Raceways, Elwood, New Jersey 08217; Ray Murray, 856-629-9413; email: RaysTrack@webtv.net

Family Hobbies Raceway, Vineland, New Jersey 08360; Linda Vogel, 856-696-5790; email: familyhobbies@yahoo.com; web: familyhobbiesraceway.com

Jackson RC Club, Jackson, New Jersey 08527; Al Sardano, 908-770-7621; email: njeyeguy@jacksonrcracing.com; web: www.jacksonrcracing.com

Jefferson Speedway, Oak Ridge, New Jersey 07438; Jim, (973) 697-7525

Millville R/C Oval & Roadcourse, Millville, New Jersey 08332; William Denstoz, 856-327-4640

PottBellys R/C Speedway, PittsGrove, New Jersey 08360; Drew Anastasio, 856-207-2495; email: pottbelly@pottbellysrc.com; web: www.pottbellysrc.com

South Jersey Cost Controlled Racing, Sicklerville, New Jersey 08081; Ray Murray, 856-629-9413; email: RaysTrack@webtv.net; web: www.sjccr.com

SpeedPro Dragway, Elizabeth, New Jersey 07206; Albie Niziolek, 908-351-5080; email: funnycar176@aol.com; web: www.speedpro.org

The Race Place, Farmingdale, New Jersey 07731; John Fary, (908) 938-5215

Trax70, Browns Mills, New Jersey 08015; Patrick Uket, 201-563-8000; email: patrick@obassey.com; web: www.Trax70.com

Wacky RC Raceway, Roselle, New Jersey 07203; Tony Williams or Kimble Wright, (908) 241-6700

NEW MEXICO

Albuquerque R/C Off-Road Raceway, Albuquerque, New Mexico 87120; Bill Mitchell, (505) 250-3411(m); email: info@rcDirtTrack.com; web: www.rcDirtTrack.com

Speed Zone, Clovis, New Mexico 88101; Brad Ferguson, 505-769-1737; email: speedzone@yucca.net

NEW YORK

(CR R/C Racers) Capital District Radio Controlled Stock Car Club, Nassau, New York 12123; Kirt Coonradt, 518-766-0029; email: cdrcscc@hotmail.com; web: http://cdrcracers.50megs.com/

BarnStormers RC Raceways, Chester, New York 10918; Lou Sytsma, 845-469-BARN(2276) o; email: iamsytsma@hotmail.com; web: www.barnstormersrc.com

Brennan's RC Hobbies, Vernon, New York; Bill or Tom Brennan, (315) 829-4930

Brooklyn Hobbies, Brooklyn, New York 11234; Chris Palermo, 718-951-2500; email: brooklynhobbies@aol.com; web: www.brooklynhobbies.com

Bruckner Racing, Bronx, New York 10465; Thomas Baffers Sr., (800)-288-8185

Chipmunk Hill R/C Speedway, Theresa, New York 13691; Ted or Pete House, (315) 628-5065

Competition Hobby Supplies & Speedway, Cohoes, New York 12047; Howie Cummings, 518-786-3622; email: howard.cummings@verizon.net; web: www.competitionhobbysupplies.com

East Coast R/C Hobbies, Brooklyn, New York 11204; John Giangrande, 718-627-3814; web: www.eastcoasthobbies.com

Fastraks, Hogansburg, New York 13655; Mark Castonguay, (518) 358-3686; email: froghobb@northnet.org; web: www.fastraks.8m.com

Hobby Zone Raceway, Ozone Park, New York 11417; Brian, Sean or Adam, (718)641-9001; email: moonchaserwolf@aol.com

Lil Wheels Raceway, Oswego, New York 13126; Bill Meyer, 343-6566; email: lilwheelsraceway@hotmail.com; web: lilwheelsraceway.tsx.org

Long Island Raceway, Farmingdale, New York 11735; James, (516) 845-7223; web: www.raceway.com

PRO Speedway, Cattaraugus, New York 14719; Marc Pritchard, (716) 257-3101

Racing City Hobbies & R/C Raceway, South Glens Falls, New York 12803; Ken Taylor, 518-792-7272; email: racingcity@verizon.net; web: www.racingcity.com

Radio Hill Raceway, Dundee, New York 14837; Bill or Greg, 607-243-8641 (Bill);

Rampage R/C & Hobbies, Hyde Park, New York 12538; Brian Walker, (845) 229-1379

South Shore Hobby & Raceway, Coram, New York 11727; Benny or Bonnie, 631-696-8500; email: southshorehobby@lionly.com

Southern Tier Raceway, Owego, New York 13827; Anita Harding, (607) 687-5395

TARMAC Ultimate R/C Raceways, Poughkeepsie, New York 12603; Todd Plass, 845-342-5409(Todd);; email: toddp@tarmacraceway.com; web: www.tarmacraceway.com

Walt's Hobby, Syracuse, New York 13209; Bruce, 315-453-2291; web: www.walts-hobby.com

Willis Hobbies R/C Speedway, Mineola, New York 11501; Ken Ford, 516-746-3944; web: www.willishobbies.com

NORTH CAROLINA

Antique Barn & Hobby Shop, Wilson, North Carolina 27893; Steve, (252) 237-6778; email: antiquebarn@earthlink.net; web: www.theantiquebarn.net

Chatham R/C Raceway, Bear Creek, North Carolina 27207; Dwight Fields, (919) 898-4518; email: crcrc@wavenet.net

R.C.R. Speedway, Salisbury, North Carolina 28147; Ronnie Linker, (704) 637-2565

Race City Motor Speedway, Mooresville, North Carolina 28115;; Ray Kelly, 704-660-FAST; email: Kellyrcms@cs.com; web: racecitymotorspeedway.com

Rosewood RC Speedway, Goldsboro, North Carolina 27530; Glenn Elam, 919-734-7754; email: gelam49@hotmail.com; web: www.glennshobbycorner.com

Sandhills Raceway, Southern Pines, North Carolina; Mike Russel, 910-245-4450; email: mrmrc@mindspring.com; web: www.sandhillsraceway.com

Southern R/C Motorsports Club, Shallotte, North Carolina 28459; Chris Dixon, (910) 754-6315; email: nohope@atmc.net

Xtreme Dirt RC Raceway & Xtreme On-Rd Raceway, Kannapolis, North Carolina 28083; Chris Lyerly-Xtreme Hobbies, Inc., 704-933-5321; email: thehobbyshop02@aol.com

OHIO

AK Hobby & Raceway, Cincinnati, Ohio 45211; Tim Tolle, (513) 661-7080; email: tim@akhobby.com; web: www.akhobby.com

American Ohio Sprint Car Association, Wickliffe, Ohio 44092; Gary Waldhelm, 440-944-9966; web: www.aosca.8m.com

Black Swamp RC Car Club, Toledo, Ohio 43623; Riders Hobbies, 419-843-2931; email: ridersrcclub@webtv.net; web: www.blackswamprc.cjb.net

D&J R/C Raceway, Orrville, Ohio 44667; Don, (330) 682-4266

DeFosse Raceway, Ripley, Ohio; Greg DeFosse, (937) 377-2063

Hobbyland Raceway, Proctorville, Ohio 45669; Craig Harber, 740-886-0502or 740-8; email: pitroweracing@webtv.net; web: hobbylandraceway.homestead.com

Mid Ohio Dirt Oval, Lexington, Ohio 44904; D&D Hobby Center, (419) 884-0001

Nothing But Air R.C. Track, Logan, Ohio 43138; Gary Lloyd, 740-385-0288

Ohio Valley OffRoad R/C Raceway, Jerusalem, Ohio 43747; Kevin Wilson, (740) 926-1738; email: consol@1st.net; web: www.ovor.8M.com

Outlaw Speedway, Lexington, Ohio; Eric Radio, 419-884-0001; email: kramerjc@aol.com; web: rcdirtoval.freeservers.com

R/C Hobby, Medina, Ohio 44256; Chris Kohout, 330-723-0255; email: kohouty@aol.com

RaCeway 42, Mansfield, Ohio 44905; Chris Cates, 419-589-4173; email: mopar340v8@aol.com; web: www.RaCeway42.itgo.com

River Rat Racing, Ripley, Ohio 45167; Jon Faris, 937-392-9298; email: honey3@bright.net; web: www.riverratraceway (under construction)

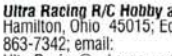
KEY TO SYMBOLS

Indoor		Concrete	
Outdoor		Asphalt	
Off-road		Minis & Micros	
On-road		On-site hobby shop	
Oval		AC power	
Dirt oval		Auto lap counting	
Carpet		Food available	

T.S.R.C.A.R., Hamilton, Ohio 45011; *Dennis Young,* (513) 367-5634; *email:* scaleracr@aol.com; web: www.tri-statercautoracers.com

TARCAR, Toledo, Ohio 43617; Bill Bridges, (419) 826-3859

Ultra Racing R/C Hobby and Track, Hamilton, Ohio 45015; Ed Lewis, 513-863-7342; email: UltraRacing@aol.com; web: UltraRacing.com



Van Wert R/C Raceway, Van Wert, Ohio 45891; Mark Davis, (419) 232-2112

Y-City Hobby & Speedway, Zanesville, Ohio 43701; Kevin McKenna, (740)455-3025; email: Kevin@ycity-hobby.com; web: www.ycityhobby.com

OKLAHOMA

Action Hobbies, Tulsa, Oklahoma 74145; David Cole, (918)663-8998; email: acthobii@aol.com

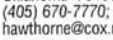
Action RC Speedway, Oklahoma City, Oklahoma 73135; Jerry Hawthorne, (405) 670-7770; *email:* ginna-hawthorne@cox.net; web: www.action-rc.com

Adams Creek R/C Speedway, Broken Arrow, Oklahoma 74014; John Beighle, (918) 355-1416

Competition R/C, Oklahoma City, Oklahoma 73149; James or Louise Brown, (405) 634-0809; email: com-prc1@aol.com

Enid R/C Speedway, Enid, Oklahoma 73703; Darin Pendleton, (580) 554-9400; *email: darin@enid.com;* web: www.enidrcracing.com

HobbyTown USA--Norman OK, Norman, Oklahoma 73072; Todd Jenson, (405) 292-5850



Wings N Things Raceway, Tulsa, Oklahoma 74105; Heath Anderson, (918) 745-0007

OREGON

Competition Racing Association, Portland, Oregon 97230; Mark Taylor, *Pres., 503-761-1334;* email: mark@cra-news.com; web: cra-news.com

R/C Plus Hobbies Raceway, Salem, Oregon 97302; Ron Smith, (503) 364-9188; email: rcplus@rcplus.com; web: www.rcplus.com

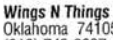
Rose City Scale Racing, Portland, Oregon 97201; Dominic, 503-484-8887; email: dominic@rc-cars.com; web: www.rc-cars.com

PENNSYLVANIA

Bumps & Jumps RC Speedway, Etters, Pennsylvania 17319; Chris McKinney, 717-932-3000; email: bumpsandjump-src@comcast.net; web: http://www.bumpsandjumpsrc.com

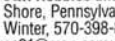
DC Ultra Trax, Warminster, Pennsylvania 18974; David Cowan, (215) 672-5200; web: www.jcrchob-bies.com

Dirtburners Club sponsored by Schmidt's Hobby, Windber, Pennsylvania 15963; Bruce Schmidt, (814) 266-4118; email: rcman@floodc-ity.net; web: www.rcman.net



Dreamboat Hobbies, Warren, Pennsylvania 16365; *Louie Dussia,* (814) 723-8052; email: dream-boat77@yahoo.com; web: www.dream-boathobbies.com

J&K Hobbies and Raceway, Jersey Shore, Pennsylvania 17740; Shawn Winter, 570-398-8171; email: rcmani-*ac01@msn.com;* web: www.JandKHobbies.com



Kranzel's R/C Raceway & Hobbies, Lemoyne, Pennsylvania 17043; David or Stuart Kranzel, (717) 737-7223; web: www.kranzelsrchobbies.com

Little Plum R/C Hobbies, Lock Haven, Pennsylvania 17745; Larry Duck, (570) 769-1984

Marshall's R/C Raceway, Honesdale, Pennsylvania 18431; Bill or Dot Marshall, (570) 729-7458

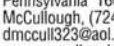
McCullough's Offroad, Sarver, Pennsylvania 16055; Doug McCullough, (724) 352-0116; email: dmccull323@aol.com; web: www.mccullroughsoffroad.com

Newville RC Speedway & Hobbies, Newville, Pennsylvania 17241; Randy or Mike, 717-776-5568; email: newvillercspeedway@yahoo.com; web: www.newvillercspeedway.com

Pit Stop Hobbies-Mount Joy, PA, Mount Joy, Pennsylvania 17552, (717) 653-6222; email: pitstophobbies@pit-stophobbies.net; web: www.pitsto-phobbies.net

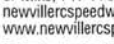
Racers Edge R/C Racing & Hobbies, Smethport, Pennsylvania 16749; Rick Morgan or Johna Simar, (814) 887-9256; email: postmaster@rac-ersedgerc.com; web: www.rac-ersedgerc.com

RB Motorsports & Hobby, Northumberland, Pennsylvania 17857; Rick Bunting, (570) 473-8711

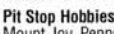


RC Avenue Raceway, Bradenville, Pennsylvania 15650; Stan Vensel, 724-396-7628; email: mrmud@kiski.net

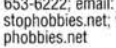
RC Outfitters, Hanover, Pennsylvania 17331; Chris Shaffer, (717) 633-9490; *email: thestore@rcohobbies.com;* web: www.rcohobbies.com



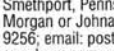
Riverside Raceway, Warren, Pennsylvania 16365; Jeff, (814) 723-4211



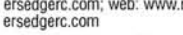
Staub Bros. R/C Speedway, Gettysburg, Pennsylvania 17325; Todd or Scott Staub, 717-334-8488; web: www.staubbrothers.com



The Raceway at River Junction, Beaver, Pennsylvania 15009; Sam or John, (724) 728-5571; email: river-jct@stargate.net



Thunder Road Raceway, Limerick, Pennsylvania 19468; Barry or John, 610.831.8898; email: xslotgodx@aol.com; web: www.tow-barrc.com



Trains & Lanes Raceway, Easton, Pennsylvania 18045; Jeff Setzer, (610) 253-8850 or (8; email: trainslanes@aol.com

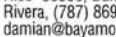
TRP, Kingston, Pennsylvania 18704; Rob Yeager, 570- 283-3066; email: rcrob99@aol.com

Washington RC Raceway, *Washington, Pennsylvania 15301;* Aaron Stimmell Jr., 724-228-8396

WillCam Raceway, Punxsutawney, Pennsylvania 15767; James Campbell, (814) 939-4251

PUERTO RICO

Bayamon R/C Park, Bayamon, Puerto Rico 00956; Damian Cruz & Javier Rivera, (787) 869-8092 & 401; email: damian@bayamonrcpark.com; web: www.bayamonrcpark.com



Hi-Speed C Raceways, San Juan, Puerto Rico 00926; Carlos Ortiz, (787) 283-0198; email: hispeed@hotmail.com; web: www.his-peedhobby.com

Mech Tech Touring Park, Caguas, Puerto Rico 00725; Humbert (Tito) *Lizardi,* (787) 739-1572; *email:* tlizar-di@hotmail.com

Tropical Raceway Track, Manati, Puerto Rico 00674; Hector Pabon/ George Pabon, 787-785-9529; email: trophobb@coqui.net; web: www.tropi-calhobby.com

RHODE ISLAND

Insane Track, Cranston, Rhode Island 02907; Jose Jimenez, 401-467-8878; email: chevygo8@aol.com; web: www.insanehobbies.homestead.com

SK Hobbies Inc., Johnston, Rhode Island 02919; Slim or Keith, (401) 453-1440

SOUTH CAROLINA

Atomic Racers, Aiken, South Carolina 29803; John Felak, 803-642-0314; web: http://AtomicRacers.tripod.com

Carolina R/C Speedway, Easley, South Carolina 29640; David, 864-295-1209; email: cprahlrc@mindspring.com; web: www.carolinarc.com

Darlington R/C Raceway at Hobbies & More, Darlington, South Carolina 29532; Jerry Pollard, (843) 393-0355; web: www.hobbiesnmore.com

DirtSlinger's, Hartsville, South Carolina 29550; Don Dietz, 843-383-0017; email: dshobbiesdon@aol.com; web: www.dands-speedway.50megs.com

Hi Voltage Raceway, Anderson, South Carolina 29625; Whitner Bowen, 1-864-225-8680; email: Jahlion247@aol.com

The Grove Racing Center, Rockhill, South Carolina 29730; Don Faris, (803) 327-4121; web: www.hob-bystop.com

SOUTH DAKOTA

Dakota Off-Road Racers, Aberdeen, South Dakota 57401; Kevin, 605-225-5223

Grassland Racers, Black Hawk, South Dakota 57718; Ryan Logan, (605) 787-5632

Triple B, Winner, South Dakota 57580; Broc Stout, (605) 842-2699

TENNESSEE

Hobby Town USA, Franklin, Tennessee 37067; Bobby Mills, (615) 771-7441; email: htu126@aol.com

Mid-South Racing Association, *Memphis, Tennessee 38133;* Michael Feliciano, 901-268-7969; email: michael.feliciano@expeditors.com; web: www.msra-racing.com

MSA R/C Racing, Crossville, Tennessee 38555; D.R. Findley, (931) 456-0027

Need For Speed Raceway R/C, Chattanooga, Tennessee 37415; Ronnie Cox, (423) 876-9019

Robertson's R/C Raceway, Jackson, Tennessee 38301; Travis Robertson, 731-423-6984; email: RobertsonsRC@aol.com

SpeedZone Raceway Park, Athens, Tennessee 37303; Mike Henderson, 423-744-8358; email: speedzon@msn.com; web: www.speedzoneraceway.com

W.O.W. Raceway, Beech Bluff, Tennessee 38313; Brad Jones, 731-427-1625; email: wowracer@charter.net; web: go.to/wowracing

TEXAS

215 Speedway, Abilene, Texas 79602; Clyde Gardner, (915) 673-2351

Al's Hobbies, San Antonio, Texas 78227; Alfonso Robles, 210-645-1050; email: alshobbies@usa.com; web: *www.alshobbiesusa.com*

Austex RC, Austin, Texas 78757; Michael, 512-458-2324; web: www.austexrc.com

B&B R/C Hobbies, Big Spring, Texas *79720; Walter Bumbulis,* (915) 263-1790; email: b&brchobbies@apex2000.net

Big Mike's R/C Raceway, Longview, Texas 75604; Mike Sumrow, 903-297-7814

Drycreek Raceway, Greenville, Texas 75402; Micky Alphin, 903-527-5381; email: drycreek@pulse.net; web: web.pulse.net/drycreek

Finishline Raceway, Hurst, Texas 76053; Damon Darnall, (972) 404-0463; *email: Finishline@ev1.net; web:* http://users.ev1.net/~finishline/index.ht m

Hal's Hobby Raceway, El Paso, Texas 79936, (915) 591-2213; web: www.halshobbywarehouse.com

Hobby Center Race Track, Houston, Texas 77598; Issac Ben-Ezra, 281-488-8697; email: Hobbycenter@issac-smodels.com; web: www.hobbycen-ter.cc

Hobbytown USA--San Antonio TX, San Antonio, Texas 78209; Clark, (210) 829-8697; fax

Indy R/C World, Garland, Texas 75041; Steve Webster, (972) 271-4844; fax; web: www.indyrcworld.net

Js Action R/C, Pasadena, Texas 77504; Jack Williams, 713-946-8888; email: jayactionrc.net; web: www.jsac-tionrc.com

K&M Racing, New Caney, Texas 77357; Brent Mahaffy, (281) 399-9777

M&M Hobby Center, Bellaire, Texas 77401; *Meir Ben-Ezra,* 713-661-7137; email: mandm@mmhobby.com; web: www.mmhobby.com

MBRC, Dallas, Texas 75093; Mike Battiele; email: info@mbrc-racing.com; web: www.mbrc-racing.com

Mike's Hobby Shop Superstore & Raceway, Carrollton, Texas 75006, 972-242-4930; email: mike@mikeshobbyshop.com; web: www.mikeshobbyshop.com

Reflex R/C, Houston, Texas 77055; Joseph Chen, (713) 464-4458; web: www.reflexrc.com

T&M Raceway R/C Drag Racing, Addison, Texas 75244; Marvin Jackson, (972) 416-0445; email: mjackson@tmraceway.com; web: www.tmraceway.com

T&T R/C Cars, Plano, Texas 75024; Joe Sullivan, (972) 633-2470

The Rollcage, Greenville, Texas 75402; Guy Allen, (903) 883-0332; email: rollcage2000@therollcage.com; web: www.therollcage.com

Thompsons RC Raceway, Lufkin, Texas 75901; Mark Thompson, (936) 637-0093

W.E.S. Hobby Race, Beaumont, Texas 77701; Marty Walker, (409) 839-4929

X-Treme Hobbies, Round Rock, Texas 78664; Jef Santos, (512) 310-0444 or (5

UTAH

Hobbie Stop Raceway, Riverdale, Utah; Todd Hamilton or Beazer Martin, (801) 622-0841

Intermountain R/C Raceway, Magna, Utah 84044; David Mott, 801-250-8303; email: rcmother1@aol.com; web: www.IRCRaceway.com

Outback Raceway, Ogden, Utah 84404; Steve Brown or Beazer Martin, 801-726-3458; email: Steve@rmrcr.com or Beazer@bibbs.com; web: www.rmrcr.com or www.beazershob-bies.com

Vision Hobby, Orem, Utah 84057; Ken Rice, (801) 226-6226

VERMONT

Empire Hobbies Off-Road Raceway, Saint Albans, Vermont 05478; Scott or Jen, 877-446-2243; email: empirehob-bies@adelphia.net; web: www.empire-hobbies.com

R/C Toy Box Hobbies & Tracks LLC, Saint Johnsbury, Vermont 05819; *Raymond Richard, 802-748-1030;* email: ray@rctoybox.com; web: www.rctoybox.com

VIRGINIA

Brad's Hobbies, Staunton, Virginia 24401; Brad, (540) 885-3642; email: brad@bradshobbies.com; web: www.bradshobbies.com

Brown Brothers Hobbies, Dumfries, Virginia 22026; Joe or Bob Brown, 703-221-5746; email: joe@bbhobbies.com; web: www.bbhobbies.com

Cooper's Radio Control Race Center Inc., Chatham, Virginia 24531; Norris L. Cooper, 434-724-4182; email: nlcooper@earthlink.net; web: www.coopersrc.com

DRCW Raceway, Virginia Beach, Virginia 23454; Les Modlin, 757-340-6681; web: www.debbiesrcworld.com

Hampton Roads R/C Drag Club, Virginia Beach, Virginia 23452; Garry Nelson, 757-399-8645; email: Garry@gsdragracing.com; web: www.HRRCDC.com

KC's Radio Control & Repair, Lynchburg, Virginia 24503; Curtis or Kim Wright, (804) 384-8596

Linville Hobbies Raceway, Linville, Virginia 22834; Jason or Jerry Shenk, (540)833-2222; email: linvillehobbies@juno.com; web: www.linvillehobbies.com

Olde Towne Hobby Shoppe, Manassas, Virginia 20110; Jeff Gough, (703) 369-1197; web: www.ManassasHobby.com

Roanoke R/C Club, Salem, Virginia 24153; Chad Trent, 540-314-6257; email: roanokerc@dooleyprinting.com; web: roanokerc.cjb.net

Shamroc Raceway, Winchester, Virginia 22601; Charlie Greathouse, 540-678-8878; web: www.shamroc.homestead.com/frontpage.html

Stream Hobby Shop, Newport News, Virginia 23605; Rusty Kennedy, 757-591-0720; email: stream.hobbyshop@verizon.net; web: streamhobbyshop.com

The Tiltyard, Dayton, Virginia 22821; Homer, 540-828-3476; email: homer@tiltyard.com; web: www.tiltyard.com

Thunder Road RC Speedway, Gordonsville, Virginia 22947; Robert Bingler, 434-296-6549; email: tripod@thunderroadrc.com; web: www.thunderroadrc.com

Tidewater R/C Speedway, Inc., Hampton, Virginia 23663; Jim Pike, Rob Marsette, Dave Pritchard, (757) 723-8927; email: zeeya31@hotmail.com

WASHINGTON

A-Main Raceway, Vancouver, Washington 98685; Monty Coleman, (360) 571-8404; web: www.amainraceway.com

Atomic Hobby, Issaquah, Washington 98027; Stanley Ng, (425) 391-8890; email: atomichobby@msn.com; web: atomichobby.com

Burien Toyota R/C, Seattle, Washington 98148; Ray Meek, (800) 654-6456

Cedardale Raceway, Mount Vernon, Washington 98273; Craig, 360-755-9464

Fantasy World Raceway, Tacoma, Washington 98408; Dave Kleinman, (253) 473-6223; email: sales@fantasyworldhobbies.com; web: www.fantasyworldhobbies.com

Four Season R/C Racing, Olympia, Washington 98506; Gary and Sharon Brown, (360) 491-2430

Hank Perry Raceway, Spokane, Washington 99023; Hal Hudson, 509-879-3503; email: halshudson@msn.com

HobbyTown USA--Lynnwood WA, Lynnwood, Washington 98037; Rich or Jamie, 425-774-0819; email: rhobbytown@aol.com

HobbyTown USA--Tacoma WA, Tacoma, Washington 98408; HobbyTown USA Shop, (253) 474-7787

Paradise Raceway and Hobbies, Spokane, Washington 99207; Mark, 509-483-1843; email: paradiserc@hotmail.com; web: www.websellers.com/paradise

Race City, Auburn, Washington 98002; Bruce, (253) 939-2515; email: auburn@pacifier.com

Rain City RC Raceway, Lynnwood, Washington 98036; Pete or Debbie Cartwright, 425-776-8241; email: info@raincityraceway.com; web: www.raincityraceway.com

Schmidt's Auto Parts, Marysville, Washington 98271; Jon Failla, (360) 653-8838; email: schmidtsrc@aol.com; web: www.schmidtsrcraceway.com

Spokane Indoor Raceway, Spokane, Washington 99212; Brian Batch, 509-487-2122

Tacoma R/C Raceway, Tacoma, Washington 98406; Scott Brown, (253) 565-1935; web: www.tacomarcraceway.com

West Coast Hobby & Raceway, Richland, Washington 99352; Darren Shank, (509) 375-4995

WEST VIRGINIA

Burr Fab R.C. Raceway, West Union, West Virginia 26456; Mark Travis, 304-873-2487; email: burrshouse1@cs.com

Fulton's R/C Raceway, Wheeling, West Virginia 26003; James Fulton, (304) 233-5355

Mountwood Raceway, Vienna, West Virginia 26105; Tom Allen, 304-295-3234; email: ray@ovrccc.com; web: www.ovrccc.com

Quiet Dell Raceway, Fairmont, West Virginia 26554; Darris, (304) 366-1441; email: Tateracing@aol.com

WISCONSIN

ABC R/C Inc & Raceway, Waukesha, Wisconsin 53186; Dick Mathiesen, 262-542-1245; email: Help@abcrchobby.com; web: www.abcrchobby.com

Gary's Hobby Center, Racine, Wisconsin 53403; Bill Phalen, 262-554-8884

Hobbytown Oshkosh-The New Revolution Raceway, Oshkosh, Wisconsin 54901; Bill Magritz-Race Director, 920-426-1840; email: hobby807@sbcglobal.net; web: www.hobbytownoshkosh.com

KDM Hobby & Raceway, Abbotsford, Wisconsin 54405; Kevin Michlig, 715-223-4414; email: kdmhobby@charter.net; web: kdmhobby.homestead.com/kdmhobby.html

MARCCA Raceways, Poynette, Wisconsin 53955; Don Hartley, 608-243-1778; email: hotrodhartley@aol.com; web: www.marcca.com

Mid-West Tri-Clone/Tri-Clone OffRoad, West Bend, Wisconsin 53095; Dave Hilpert, 262-334-0429 or 262-; email: mwtc@hnet.com; web: www.triclone.com

Oshkosh RC, Oshkosh, Wisconsin 54902; Bob, 920-426-1840; email: hobby807@sbcglobal.net; web: www.hobbytownoshkosh.com

Pro-Star Racing, Green Bay, Wisconsin 54301; Chuck or Randy, Chuck-920-494-1233/R; web: www.prostarracing.com

S&N's Trackside Hobbies and Raceway, Milwaukee, Wisconsin 53005; Scott Ernst, 262-783-4699; email: sernst@trackside.com; web: www.trackside.com

The Shorthalf Raceway, Eau Claire, Wisconsin 54701; Scott Schoettle, 715-838-8350; email: Scottschoettle@mcleodusa.net

WYOMING

Xtreme Hobbies & Raceway, Gillette, Wyoming 82718; Krieg Balls, 307-682-6077; email: xtremeraceway@collinscom.net

ARGENTINA

Circito R/C Lobos, Lobos 7240; Rupert Bruce, 54-02227-422905; email: rclobos@yahoo.com; web: www.rclobos.8m.com

Circuit M.R. Models, Buenos Aires 1428; Maximiliano Roballos, 54 11 4557 1000, fax; email: info@kyosho-argentina.com.ar; web: www.kyosho-argentina.com.ar

Club A. Velez Sarsfield, Buenos Aires; Jorge Herrero, 54-01-658-5851

AUSTRALIA

A.C.T. Model Car Racing Club, Wanniassa; Gary Davey, 61-6-2871411

A.C.T. Remote Control Car Club, Kambah; Rob Jorgensen, 61-2-6231-9925; email: bjorgo@industry.gov.au; web: www.actrccc.com

Aubry R/C Car Club, Aubry 2640; Ron Langman, 060-247-128

Brisbane Dirt Racing, Brisbane 4053; Jeff Chandler, 07 3355 7476, 041 8; email: bigfix@bigpond.net.au; web: www.users.bigpond.net.au/bigfix

Canberra Off Road Model Car Club, Queanbeyan 2902; Graham Brown, 02 6241 3070; email: gbrown@webone.com.au; web: www.webone.com.au/~gbrown/mrccc/index.html

Canberra Off-Road Model Car Club, Narrabundah 2604; Graham Brown, 61-6-241-3070

Carine R/C Model Car Club, Inc., Greenwood; Mitchell Davies, 0418 955 981; email: t3davies@iinet.net.au

Castle Hill Radio Control Off Road Car Club, Castle Hill 2754; Peter Ellis, 0412 257 353; email: chrcorcc@nextcentury.com.au; web: www2.nextcentury.com.au/chrcorcc

Central Coast ORRCC, Bateau Bay 2261; Peter J. Knight, 61-43-693-698

Illawarra RCECC, Albion Park Rail 2527; Mel or Andrew, 042-714-683

Lakeside R/C Racing Car Club, Lansvale 2166; R. Bartolozzi, 62-2-907-9800

Melton Electric Circuit Car Association, Melton 3337; Arthur Joslin, 61-3-9747-8805

NSW Indoor R/C Raceway, Hurstville 2220; Anthony Lee or Walter Ly, 02-9585-8810

Penfield Park, Adelaide 5108; Trevor UNew South Walesorth, (618) 8289-5010

R.C. Speedway, Newcastle 2300; Andrew Dillon-Smith, 02-49265966

TFTR - Templestowe Flat Track Racers, Templestowe 3106; Nigel George, see website; email: tftr@imagefile.net; web: drive.to/tftr

The Bayside Raceway, Brisbane 4178; Nigel Bell, 07 3893 1864; email: mwr1@dingoblue.net.au

Victorian Radio Control Drag Racing Association, Melbourne 3940; John de Tracy, +61 03 59867509; email: bjrno1@hotmail.com; web: www.ozemail.com.au/~john59/index.html

Wee Waa's Offroad RC, Burren Junction 2386; Shane, 61-02-6796-1339

Wodonga R/C Car Club, Wodonga 3690; Paul Townsend, 02-6056-0706; email: townsend175@ozemail.com.au

AUSTRIA

RMC-Wien, Vienna A-1220; Herbert Holze/Martin Hrzak, +43-664-4730376

BARBADOS, WEST INDIES

R.O.A.R. (Radio Operated Auto Racing), St. Michael; Marva Clarke, (246) 427-3907

BELGIUM

ATR-Alka-Tele-Racing, Limburg; Alken, 0032-11-25-49-03

MBV-Kampenhout, Kampenhout B1910; Frank Mostrey, 0-16-65-75-18

Model Racing Club Oudenaarde (MRCO), 9700 Oudenaarde; Nicky Delmote, and fax: 32 55 30 36; email: mrco_racing@hotmail.com; web: mrco-racing.tripod.com

MRCZ, De Burg; Montie, 75-71-63

R.C.R., Retie 2470; A. Eelen, 32-14-379685

BRAZIL

AGARC AssociaÁ„o Goiana de Automodelismo Radiocontrolado, Aparecida de Goi,nia 74980-070; Zeca, Carol, Warner or Rodrigo, 062 9979 9009; email: zeca.net@terra.com.br

Amoc CassociaÁao de Modelismo B. Camboriu, Bal. Camboriu 88.330-000; Leo Cesar, (047) 366-0001

Brasilia R/C Motor Circuit, Brasilia 70000; Alexandre (Alex), 55-061-273-7205

C.A.A.R. Curitiba Associacao de Automodelismo Radiocontrolado, Curitiba 82650-530; Ronaldo Assumpcao, 55-41-354-2804

Electric Car Club R/C Santos, Santos 11065-001; Estevam or Arnaldo, 55-013-232-2536

Hobby Center, Brasilia 70.273, 061-242-0488

Hobby Planet Racing Club, Campinas 13091901; Daniel, Helio, Luciano, 019 258 2768

Jungle Drive, Rio de Janeiro 21940-490; Paulo Brito, (021) 396-0851 or (0

Off Roaders, Sao Paulo 05640; Waldir Ielpo, (055) 011-260-5628;

CANADA

C.A.R.C.A.R., Calgary; Kerry Nevatte, 403-630-8852; web: www.carcar.ca

Cactus Speedway, Kingsville N9Y 2V6; Bob Tanner, 519-326-3176; email: khunter@sparcracers.com; web: www.sparcracers.com

Cam R/C, Coquitlam V3E 1K9; Roger Brown, 604-945-3888

Circuit J.C., St. Polycarpe J0P 1X0; Jean Castellon, 450-265-3675

Circuit Teleguide ST Roch, ST Roch De L` Achigan J0K 3H0; Gerald Beauchamp, 450-588-4254; email: info@grcsr.com; web: www.grcsr.com

Copetown Raceway, Copetown; Adam Filipowicz; email: adamfilip@home.com; web: copetown-raceway.8k.com

KEY TO SYMBOLS

Indoor	Concrete
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Off-road	Minis & Micros
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Oval	AC power
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Dirt City RC, Albany, Oregon 97321; Doug Vertrees, (541) 791-1089; email: quicktemperrc@aol.com

Dynamic Hobbies, Nepean K2E7S4; Fred Zufelt, (613) 225-9634

HobbyHobby P.L.R.C., Mississauga L5M 1K8; Tom Bakonyi, 905-858-7978; email: Info@hobbyhobby.com; web: www.hobbyhobby.com

Honda House Motor Speedway, Chatham N7M 1P9; John Elliot, (519) 354-5530

Importations Louis Durmand, Saint-Jean -Baptiste-de-Nicolet J3T 1E5; Louis Durand, (819) 293-6097; email: ldurand@sogetel.net; web: public.sogetel.net/ldurand/

IROCC, Victoria V9B 5W9; Daryl Jones, (250) 478-8013; email: dbjones@shaw.ca; web: http://www.irocc.ca

Johns Jump & Grind R/C Track, Waterville B0P 1V0; John Egan, 902-538-8920; email: john.egan@ns.sympatico.ca; web: www.jjagrc.com

J-T International Raceway, Napanee K7R 8A1; N. O'Neill, (613) 354-0099

Kays Hobbies R/C Raceway, Moorefield N0G 2K0; Doug Kay, 519-638-9990; email: dougk@golden.net; web: www.kayshobbies.place.cc

Leading Edge R/C Speedway, Kingston K7M 3Y5; Mike and Tony Daicar, 613-389-4878

Mid-Canada R/C Auto Racing, Winnipeg R2J 4E6; Boyd Chwartacki, 204-444-4230; email: midcanadarc@mts.net; web: www.mid-canadarcautoracing.com

Miniatures & Passions, Ste. Therese J7E 2B4; Gilles Lachance, (450) 979-7989

Mini-Z Hobby Shop, Markham L3R 2Z4; Brian Pong, (905)940-0898; email: info@minizhobbyshop.com; web: www.minizhobbyshop.com

Prince George Radio Controlled Car Club, Prince George V2M 5R9; Doug Waller, 250-561-0035

R/C Champ Raceway, Scarborough M1H 3A4; Ben, Matthew or Louie, (416) 289-8717; web: www.rcchamp.com

R/C Fanatic de la Capitale, Charlesbourg G1G 3Y4; Marc Page (Club President), 418-265-2678; email: infos@rcfanatic.com; web: www.rcfanatic.com

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Steeltown Speedway, Binbrook L0R 1C0; Trevor Harrison, 905-692-3407 (ask fo; email: the_prodigy@zdnetonebox.com; web: www.geocities.com/s_speedway

Sudbury Organized Auto Racing, Val Caron P3E 1E6; Brad Peacock, 705-897-1435(Brad); email: soarsudbury1@hotmail.com; web: www.sudburyrc.no-ip.com

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CHILE

Nico Prohens Off/On Roaders, Ovalle 1; Nicolas Prohens, (56) 53-711579; email: nprohens@entelchile.net; web: 38939070.home.icq.com/

OFF/ON ROADERS, Santiago 1; Mauricio Wetter Ferrer, (56)09-8404174; email: mwetter@entelchile.net; web: 38939070.home.icq.com/

COLOMBIA

Club De Automodelismo Colombiano, Sanatafe De Bogota D.C.; Jorge Delgado, 1-6130588

Garoso Raceway, Cucuta; Gabriel Rodriguez, 975-751892

COSTA RICA

Club de Automodelismo RC10 Costa Rica, San Jose; Osvaldo Averhoff A, (506)2862353; email: nitrocr@hotmail.com

Hobbymania, Hispanidad San Pedro; Randall Jimenez, 506-280-9078; email: hobbymaniastore@hotmail.com; web: www.hobbymanias.com

CYPRUS

Racing Model Club, Nicosia; Andrea Sotiriou, 493186; fax 493229

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Brondby Motor Club, Brondby 2605; Soren Boy Holst, 45-36-472-462

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Chessington Radio Car Club, Worcester Park; Ian Spiller,, 0252-20657

Hampshire Racing Center, Basingstoke; Tony Eudola, 44-1276-61402

Hinckley RCCC, Hinckley; Bruce, 01455-890580

Snetterton Market Model Car Club, Norwich NR16 2JU; Lee Shore, 01760 724857; email: kekezza@fsmail.net; web: www.wheelspins.co.uk

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MAC Zweibruecken, Hueffler 66909; Matthew Bailey, 011-49-6384-1388; email: matthew_w_bailey@hotmail.com; web: www.geocities.com/matthew_w_bailey

MC Koln, Worringen 50769; Ralf Habel, 02733-477493

Mini Car Club Dortmund, Dortmund 4600; Roland Schwan, 0231/213609

Oberhausen-Altstaden, Oberhausen 46099; Josef Holl, 0208-403676

Panik Raceway, Troisdorf 53844; Guido Kraft, 0224-400259

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Autodromo Accion, San Pedro Sula; Colonia Rivera Hernandez; Eduardo Hondal, (504) 52-2061

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H.K.R.C. Model Car Racing Club, Hong Kong; Alex Chan, (852) 659-2822

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INDONESIA

Abadi Circuit, Bandung 40141; Adi Darmawan, 62-22-2021084; email: darmawaa@bdg.centrin.net.id

Ancol, Jakarta 14350; Andre Supryanata, 62 21 6506040; email: andre@cbn.net.id; web: www.auvis.com/ja

Jakarta International Twin Circuit, Dki Jaya; Fayakhun Andriadi, 6221-751243g; email: fayakhun@soon.com

Karinda Off-Road R/C Car Model Circuit, Jakarta-Selatan 12440; Wiwied W. Soedarmadi, 62-21-7900878

Pondok Cabecircut, JL. Kunir No. 83, Jakarta; Ali Agus Salim, 7403568-9; fax 74915

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ITALY

AF Models Rings, Collegno 10093; Adriano Forato, +39.011.406.00.08; email: racing@afmodels.com; web: www.afmodels.com

JAPAN

Kadena R/C Car Club, APO 96367; Ron Nason, 011-81-611-733-1334; email: Ron_Nason@hotmail.com; web: home.attmil.ne.jp/b/Carmen_Nason/home.htm

Xlwakuni R/C Track FPO AP 96310-0978; David T. Eck, 81-6117-53-3662

Yokota R/C Racers, APO 96326-0034; John Baker, 90-001-81-31175-7-64; email: a4jb@yta.attmil.ne.jp

KUWAIT

Inferno DX 4WD Track, Ahadi 61002; Yousuf Acqatari

LEBANON

Wild Willy RCC, Beirut, 00961-4-403751

MALAYSIA

Acme Speedway, Georgetown, Penang 10000; Moey Chee Cheong, 604-2613175 & 6012-4; email: s_jamm@hotmail.com

Jump Square Arena, Selanhor; Thomson Chong, (603) 656-2513

Niko Sales & Service Centre, Johor Bahru; Niko Cheng, (607) 234-3615; email: niko3@pd.jaring.my; web: www.niko.com.my

Titiwangsa Raceway, Kuala Lampur; R.A.C.E. Sdn Bhd., 03-2614496

TP Racing R/C Raceway, Selangor; WONG SOO WEI, +603 56388160; email: wong@tp-racing.com

MEXICO

Alces Off Road, Ensenada 22830; Jorge Bustamante, 667-6-1476, 61477, 8

Baja JR, Guadalajara 45000; Memo, Pancho, 33-3671-5432/33-3832; email: baja_jr@hotmail.com

Club Dinamo Monterrey, Monterrey 64890; Daniel Ornelas Elizondo, +52 (818) 3574588; email: daniel26or@hotmail.com

Club Kyosho Mexico, Mexico 04330; Fernando Lopez, 52 55 58462350; email: Omega@avantel.net; web: www.kyoshomexico.com

Desstreza Racing Club, Aguascalientes; Luis Lopez, 44 98 961296; email: luis_lopez@jabil.com

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Hobby's Formula 01120, 905-502-3620

Jaguar R/C Club, Puebla 72150; Denise or Chiro, 22-31-00-91, 22-33-0

La Hielera, Queretaro 76160; Jorge Morelos Rabell, 42-12-15-25

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Nitro Racers, san jose del cabo / los cabos; Franco Meza, (114) 1424422; email: tcstafe@prodigy.net.mx

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M.A.C. Vlymen, Nieuwkuijk; Arjan van de Graaf, 31-416-376298

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NEW ZEALAND

Capital Model Racers, Lower Hutt; Roger Whitmarsh, 04-566-5714

Counties R/C Raceway, Pukekohe; R. Northcott, 09-23-86904 or 025 9; email: ross_jam@xtra.co.nz

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Hadeland Raceway, Gran; Dag Bakke-Nilssen, 61330405

Lorenskog RC Bane, 1475 Finstadjordet; John-Harald Nymoen; email: post@lmbk.no; web: www.lmbk.no

Store-Baller Raceway, 3/17/99 61330225; Ola Raastad

PHILIPPINES

Boyel R/C Hobby Shop, Rizal; Jose Chua, 721-2555

Philipine F1/Touring Club, Quezon City 1156; Raymond Aguilar/Ron Villaflor, 896-64-15/23-30-08

Philippine R/C Association, Manila; Ronald/Manny Villaflor, 23-30-08

QCRCCC Quezon City Radio Control Car Club, Quezon City 1008; Desthy, Emer or William, 0917-8911698; email: emerlitoa@quickweb.com.ph; web: www.qcrccc.cjb.net

PORTUGAL

Aero Clube da Madeira, Madeira, fax 091-221265

SOUTH AFRICA

B.R.C.A. Boksburg Radio Car Association; email: recycle@netactive.co.za; web: www.recycle.co.za

Banana County R/C Racing Club, Margate 4275; Dennis Steenmans, 27-0-391-20975

Frantic Raceway, Welkon; Wayne Roodt, 27-57-35-72849

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Grand Prix Electric Car Club, Boksburg; Gary Gibson, 27-11-826-1720

Helderberg Radio Control Car Club, Somerset West; Andre Hollander, 024-51-2865

Lowveld Radio Control Thunderdrome, Nelspruit; Martin Van Der Merwe, 01311-534-6415

MERC Racing, Rustenburg 0300; Gerrie Pretorius, 014-5974569

Norkem Raceway Club, Gauteng; Dan de Agrella, 2711-972-7011; email: craig@mweb.co.za

Parow Radio Car Club, Parow; Stirling Spengler, 021-945-4957

Parow Radio Control Car Club, Parow 7530; Craig, +27 21 919-5859; email: craig@kingsley.co.za; web: www.speedmodels.za.org

Phoenix Raceway, Stilfontein; Lionel Edwards, 018-4842863

Pick 'n' Pay Model Car Club, Klerksdrop 2570; H. Grobks, (27) 18 46245421

Pietersburg Model Racing, Pietersburg; Peter Van Vuuren, 0152-293-0700

Pretoria Model Racers, Pretoria; Deon Cerf, 27-083-630-2045; web: www.pretoriamr.co.za

Pretoria Off Road R/C Club, Pretoria; Gert Swart, 012- 377-3238

R.A.C.E. Off Road, Maraisburg; Derrick Plank, 682-2173

R.C. Superbowl, Elsburg; Karl Fawcett, 27119076145

Rustenburg Off-Roaders, Rustenberg; Jan Van Vollenhoven, 0142- 24-846

SPAIN

A.D. Diablillos, Zaragoza; Carlos Vicente de Vera, 34-76-605350

ADAM, Madrid; Alvaro Sarabia, 01-7471113

Club Modelismo Catilla, Burgos 09080; A.J. Pereda, 34-47-240130

Club Social Sevillana, Granada; Oscar Saenz, 958-275282

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SWEDEN

Amalie Racetrack, Sollenbrunn 5-46632; Tage Johansson

PROCAR Speedway, Veddige 430 20; Lars Nordin, 46-0-340-38784; fax; email: info@procar.se; web: www.procar.se

Sollenbrunn Miniracing Club, Alingsaas; Tage Johansson, 46-322-40944; email: tage.j@swipnet.se

Staffanstorp Highway 1:8 Track, Staffanstorp 245 45; B'rje Petersson, 46 0 46-256832

torvinge raceway, rappestad 59047 vikingstad; mats johansson, 013-808445; email: mats.j@swipnet.se; web: drive.to/miracl

Touring 1:10 Raceway (& Mini-Z Raceway), Ronneby 372 35; Mikael Nilsson, +046 457 160 07; email: micke12@telia.com; web: drive.to/rrck

SWITZERLAND

E.M.B.C.M. Raceway, Seinen CH-8854; Markus Schmid, 41-1- 8605229

ERMC Raceway, Grand-Saconnex 1218; M. Maurer, 19-41-22-798-9765

JMRCV-Terraindu Levant, Geneva 1290, fax 19 41 22 7790805

THAILAND

Hobbica Circuit, Plong Maduea, Maung 73000; Mr. Supakiet Thuwachardenpanich, 66-34-258808; email: hobbica@yahoo.com

Hot Rod Raceway, Bangkok 10310; Mr. Vichai Vongphate, (662) 8602922-5

TURKEY

B&B OTO G ven Raceway, Istanbul, 0216-4186118, or 021

Baskent Otopark Raceway, Istanbul 81190; Kaan Ciftci, +90 (216) 3486332; email: taneri@superonline.com

VENEZUELA

R/C Mariche, Caracas DF 1070-A; Bruno Morganti, 58-02-241-3969 or 24

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RC INVADES HOLIDAY HAVOC

There's no better way to spread the RC gospel than to put on a demonstration in front of thousands of people at a huge, mainstream event. Vision Entertainment, our partner in the RCX radio-control expo events, did exactly that at Holiday Havoc, a two-day snowboarding, skating and music blowout. Pacific Coast Hobbies in Lomita, CA, sponsored the radio-control action, which included planes flying overhead and Losi Triple-XS touring cars prepped for drifting. Everyone had a great time, and a whole new crowd was exposed to "real" RC. It rocked!

The RC demonstrations were a complete success thanks to the staff at Pacific Coast Hobbies. These guys and gals introduced RC to thousands of spectators, and they sold a ton of gear, too.

LOSI DRIFTERS

Pacific Coast Hobbies in Lomita, CA, sponsored the RC demonstration track. The crew set up an on-road course and rented out Losi Triple-XS cars set up for drifting. Five bucks got you five minutes on the track.

SNOW RAIL

MORE THAN ONE TON OF SNOW WAS BROUGHT IN FOR THE SNOW RAIL JAM. WHEN THE SNOWBOARDERS RAN OUT OF SNOW, THEY'D SKID ALONG THE WET ASPHALT THEN RAM INTO A CHAINLINK FENCE.

More than 100 vendors exhibited their products at the Vendor Village. Skis, snowboards, skateboards and in-line skates were on sale everywhere.

HEY, DJ!

THERE WERE DJS SCRATCHING AND RAPPING AROUND EVERY CORNER.

PACIFIC COAST HOBBIES HIRED A COUPLE OF PROFESSIONAL PILOTS TO FLY RC PLANES OVER THE CROWD DURING THE SHOW (THE CHICKS MODELING WITH THE PLANE BELOW ARE NOT THE ACTUAL PILOTS). THE PLANES WERE SET UP WITH BRUSHLESS MOTORS AND FLEW ABOVE THE CROWD AT OVER 100MPH!

The Fabtech Snowcrome exhibition showed off fully pimped full-size trucks and SUVs.